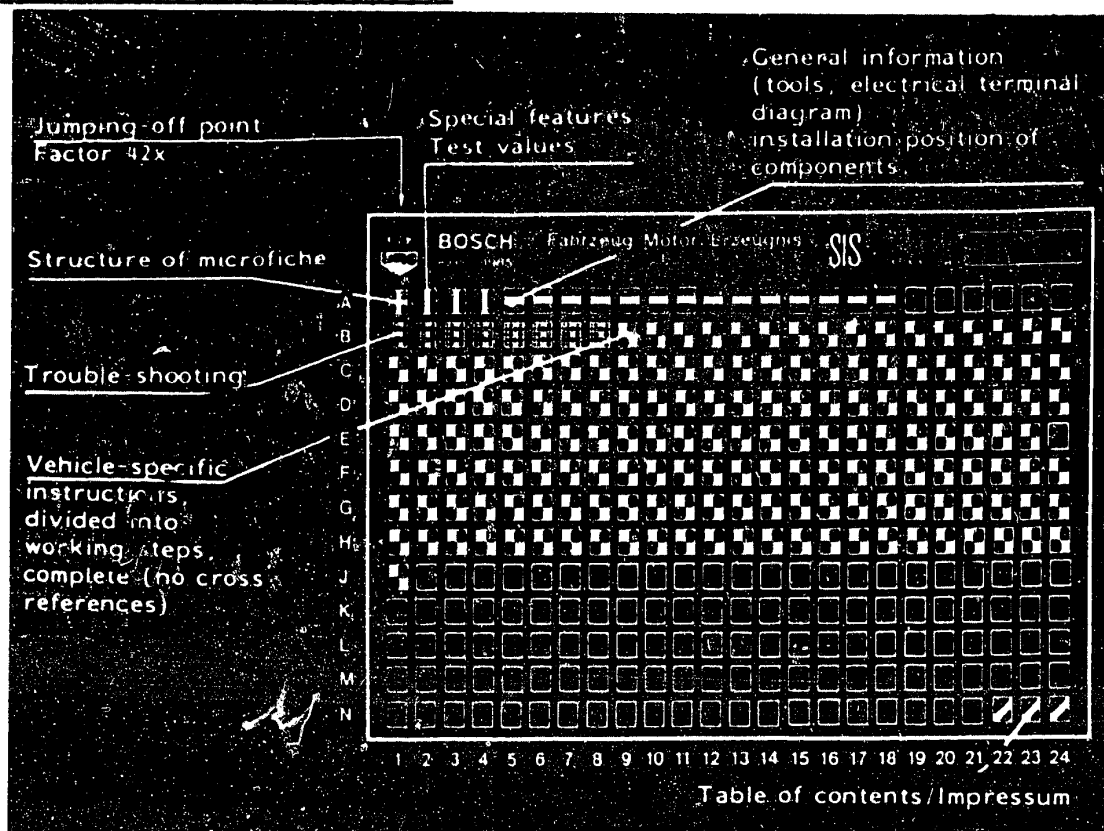


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

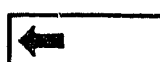
3. Limits of section



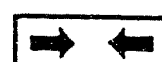
Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1

Trouble-shooting program



1. Special features

Mercedes-Benz W 124

200 D, 2.0 l 4-cylinder Europe version (engine 601)

250 D, 2.5 l 5-cylinder (engine 602)

300 D, 3.0 l 6-cylinder (engine 603)

with injection-pump M.. and RSF II governor.

2. Test specifications

C2

2.1 Idle-speed pump with PLA (pneumatic idle increase)

Engine 601 700-800 min⁻¹

Engine 602 650-750 min⁻¹

2.2 Idle-speed pump with ELR (electronic idle-speed control) installed in vehicles with automatic transmission and air conditioner

C19

Engine 603 generally has electronic idle-speed control (ELR).

Engine	Idle-speed with control	without control
601	720 ± 20	660 ± 40
602	680 ± 20	620 ± 40
603	630 ± 20	570 ± 40

2.3 Injection timing - pump-engine

H14

Engine	Idle-speed "PLA"	Idle-speed "ELR"	Setting value dynamic	Setting value static
601	750±50	720±20	15° ATDC (15±1° ATDC)	24° BTDC (24±1° BTDC)
602	750±50	680±20	15° ATDC (15±1° ATDC)	24° BTDC (24±1° BTDC)
603	---	630±20	15° ATDC (15±1° ATDC)	24° BTDC (24±1° BTDC)

A2

Test specifications

MB 200D, 250D, 300D, (W 124)



2.4 Idle increase with PLA (engine cold)

Min. 100 min.⁻¹ at approx. 500 mbar vacuum

C15

2.5 Allowable pressure drop of vacuum system

from 500 to 400 mbar approx. 1 minute

D19

2.6 Nozzle-opening pressure

New nozzles 115 - 123 bar

Used nozzles min. 100 bar

D22

2.7 Compression loss

Max. 25%

F5

2.8 Delivery of supply pump

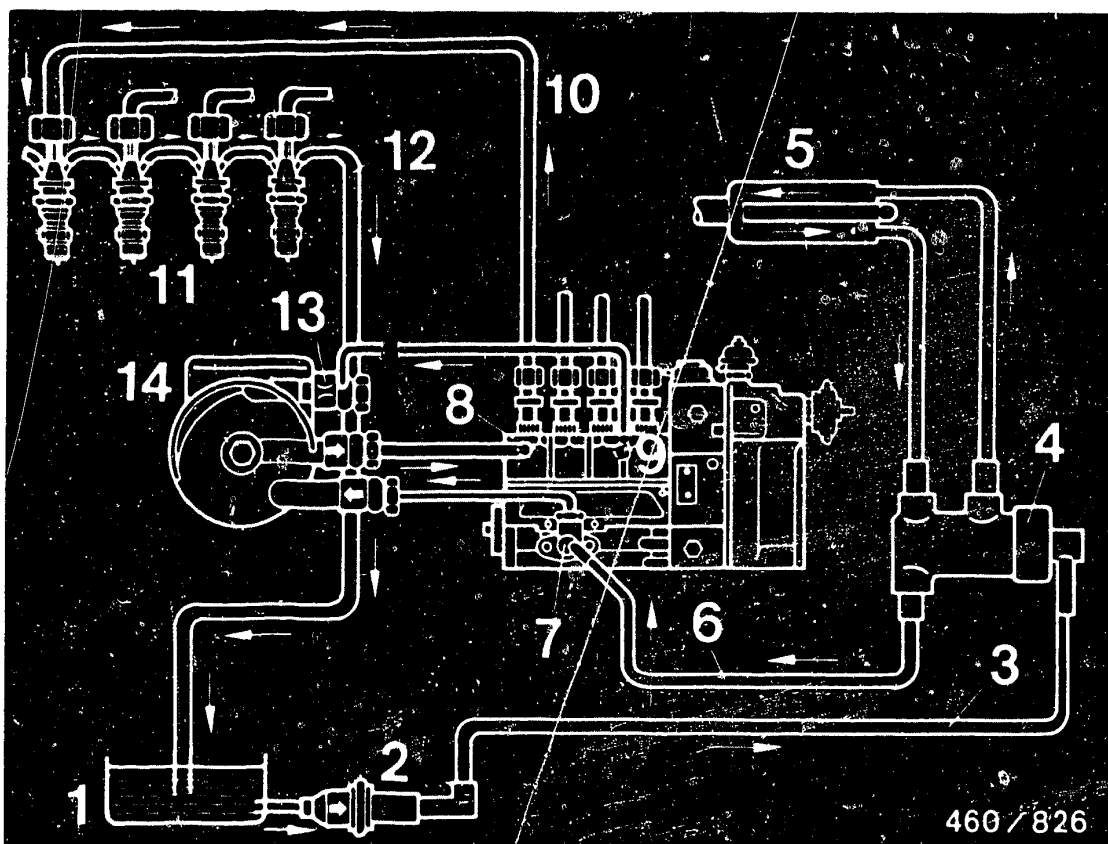
Min. 200 ml/30 s at cranking speed
(Stop lever depressed).

E7

2.9 Tightening torques

Injection line	10 - 20 Nm
Injection-pump flange	20 - 25 Nm
Central fastening screw on timing device (LH thread)	40 - 50 Nm
Screw plug on governor for dynamic start-of-delivery setting	30 - 35 Nm
Nozzle-and-holder assembly	70 - 80 Nm
Delivery-valve holder	35 Nm
Nozzle-retaining nut	70 - 90 Nm
Fan fastening screw	25 Nm
Rod-type glow plugs	20 Nm
Chain tensioner	80 Nm





460/826

- | | |
|---------------------------------------------------|-------------------------------------------------------------|
| 1 = Fuel tank | 8 = Injection pump |
| 2 = Fuel prefilter | 9 = Overflow valve with
1.5 mm \varnothing restriction |
| 3 = Inlet line - cold
fuel | 10 = Injection line -
cylinder 1 |
| 4 = Fuel thermostat | 11 = Injection nozzles, |
| 5 = Heating flow pipe with
fuel heat exchanger | 12 = Leak-off line |
| 6 = Return line - pre-
heated fuel | 13 = Restriction bore
0.8 mm \varnothing |
| 7 = Supply pump | 14 = Fuel filter top part |

3. Diagram of lines

3.1 Diagram of fuel lines

The fuel lines are connected in accordance with the above diagram. The fuel flows in the direction of the arrows.

(Valid for 4-, 5-, and 6-cylinder pumps (only 4-cylinder pump in picture)).



Note on fuel preheating

A fuel heat exchanger is installed in the inlet line to preheat the fuel. The fuel thermostat regulates the inlet quantity through the heat exchanger or directly to the supply pump on the injection pump.

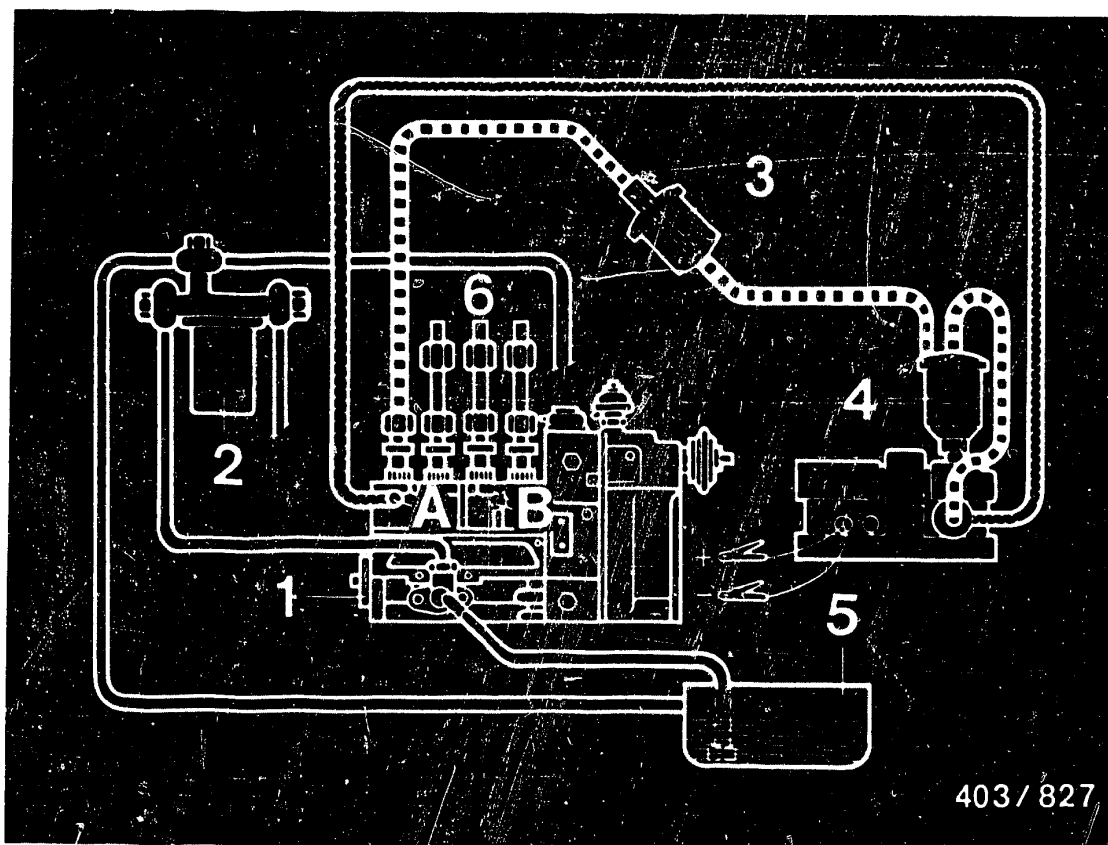
Up to $+8^{\circ}\text{C}$ the entire fuel flow is directed through the fuel heat exchanger.

Between $+8^{\circ}\text{C}$ and $+25^{\circ}\text{C}$ the fuel is blended depending on temperature.


Above $+25^{\circ}\text{C}$ the inlet bore to the fuel heat exchanger is closed by the thermostat.

The fuel flows directly to the supply pump on the injection pump.





 Return line

 High pressure approx. 30 + 4 bar

- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.

3.2 Connection diagram for setting the start of delivery (static)

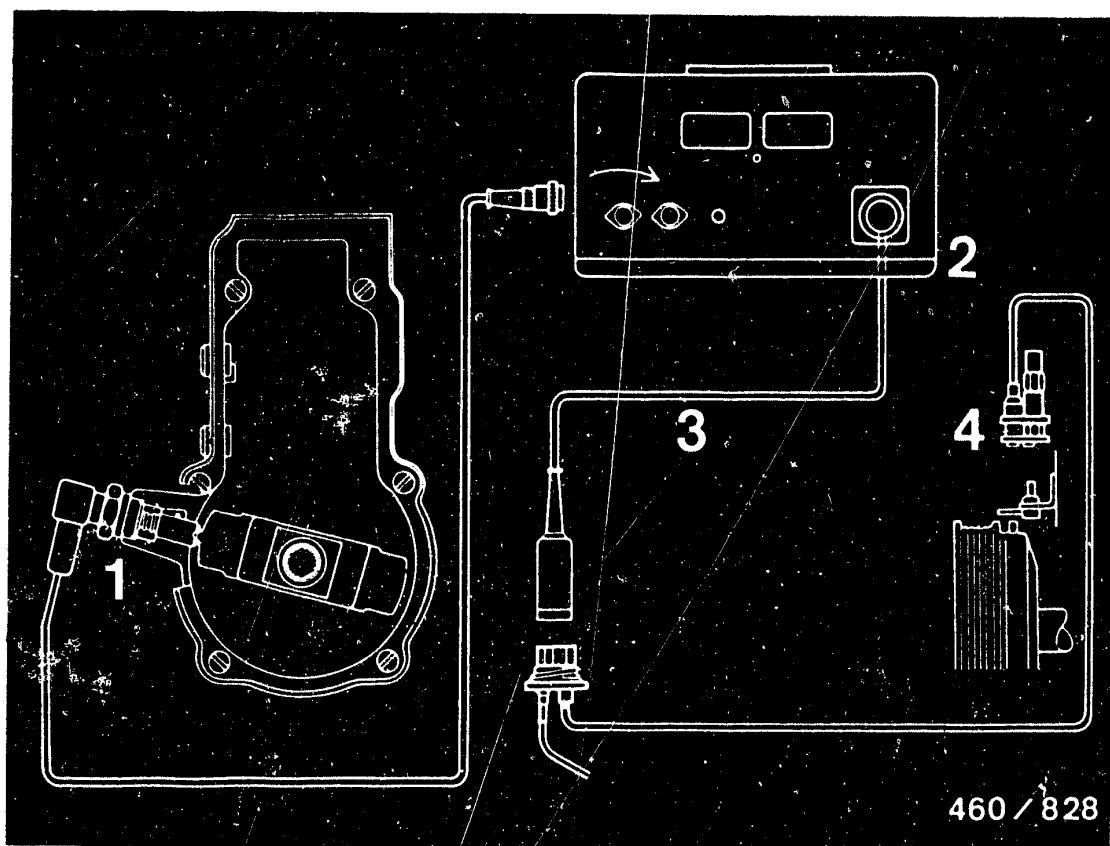
High-pressure overflow method

(Valid for 4-, 5-, and 6-cylinder pumps (only 4-cylinder pump in picture))

A6

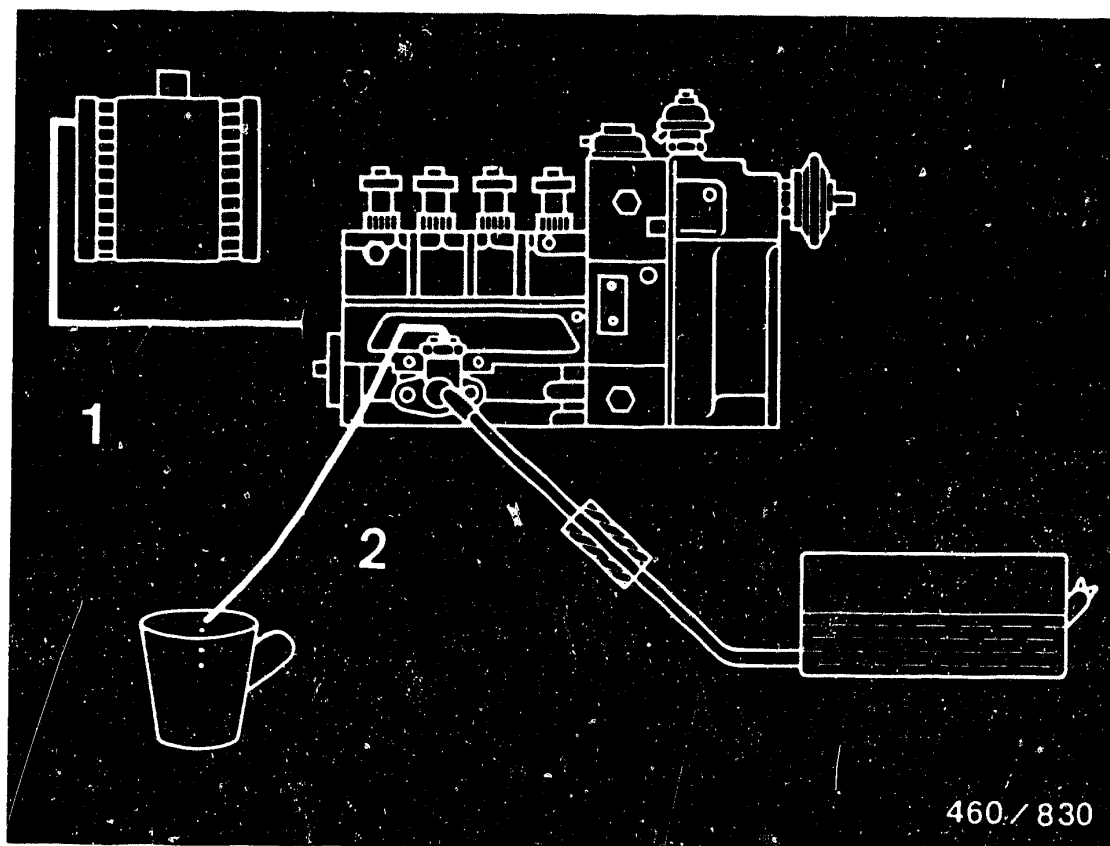
Diagram of fuel lines/connection diagrams
MB 200D, 250D, 300D (W 124)





- 1 = Governor pulse generator - Daimler Benz Part No.
617 589 102 100
- 2 = Diesel engine tester ETD 019.00 Bosch Part No.
0 684 101 900
- 3 = Adapter lead Bosch Part No.
1 684 463 147
- 4 = TDC pickup, engine 601, Daimler-Benz part no.
601 589 042 100
TDC pickup, engine 602/603, Daimler-Benz part no.
603 589 002 100

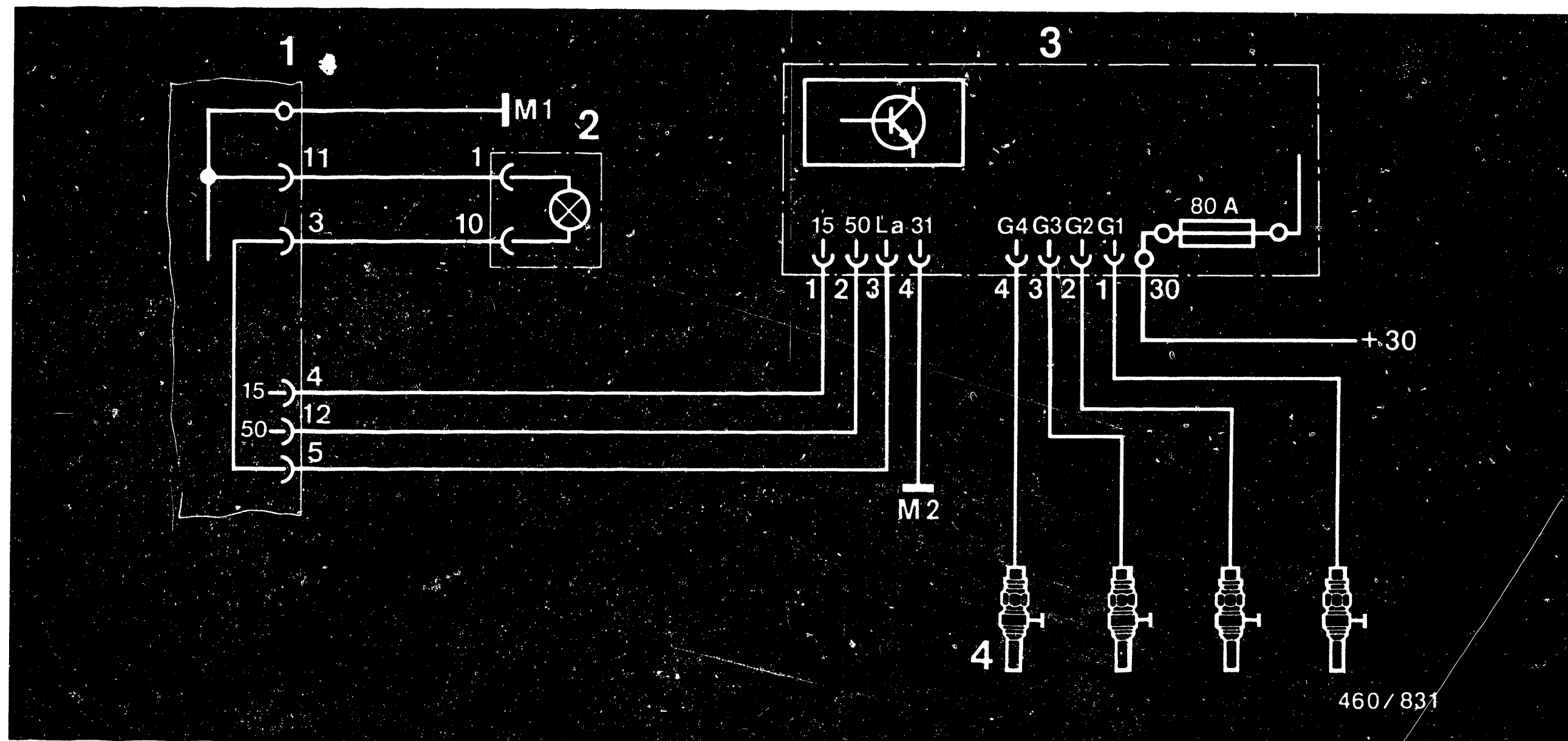
3.2.1 Connection diagram for dynamic testing of start of delivery with diesel engine tester ETD 019.00



1 = Pressure line
2 = Test line

3.3 Connection diagram for testing of supply pump





- 1 = Central-electrics console
 2 = Glow-plug indicator in instrument cluster
 3 = Glow-duration unit
 4 = Sheathed-element glow plugs
- M 1 = Main ground behind instrument cluster
 M 2 = Ground front left (near lamp unit)

4. Terminal diagram for preheating system

(Valid for 4-, 5-, and 6-cylinder pumps (only 4-cylinder pump in picture))

A9

Terminal diagram - preheating system
 MB 200D, 250D, 300D (W 124)



A10

Terminal diagram - preheating system
 MB 200D, 250D, 300D (W 124)



5. Test equipment and tools

Description	Part number	Use
Nozzle tester	EFEP 60 H 0 681 200 502	Testing injection nozzles
Compression tester	Commercially available	Testing engine compression
Compression loss tester	EFAW 210 A 0 681 001 901	Testing engine compression loss
Nozzle cleaning tool	KDEP 2900	For cleaning hole-type pintle nozzles
Smoke meter Accessories box with metering pump	0 684 102 050 0 681 169 038	Smoke test
Start-of-delivery setting device	KDEP - P 200	Injection timing, static
Connecting parts for KDEP - P 200	KDEP - P 200/50	Injection timing, static
"Mityvac" hand vacuum pump	Firma K o r i n t h Ludwig-Kloos- Straße 21 6450 Hanau 7 (Steinheim)	Leak test

A11

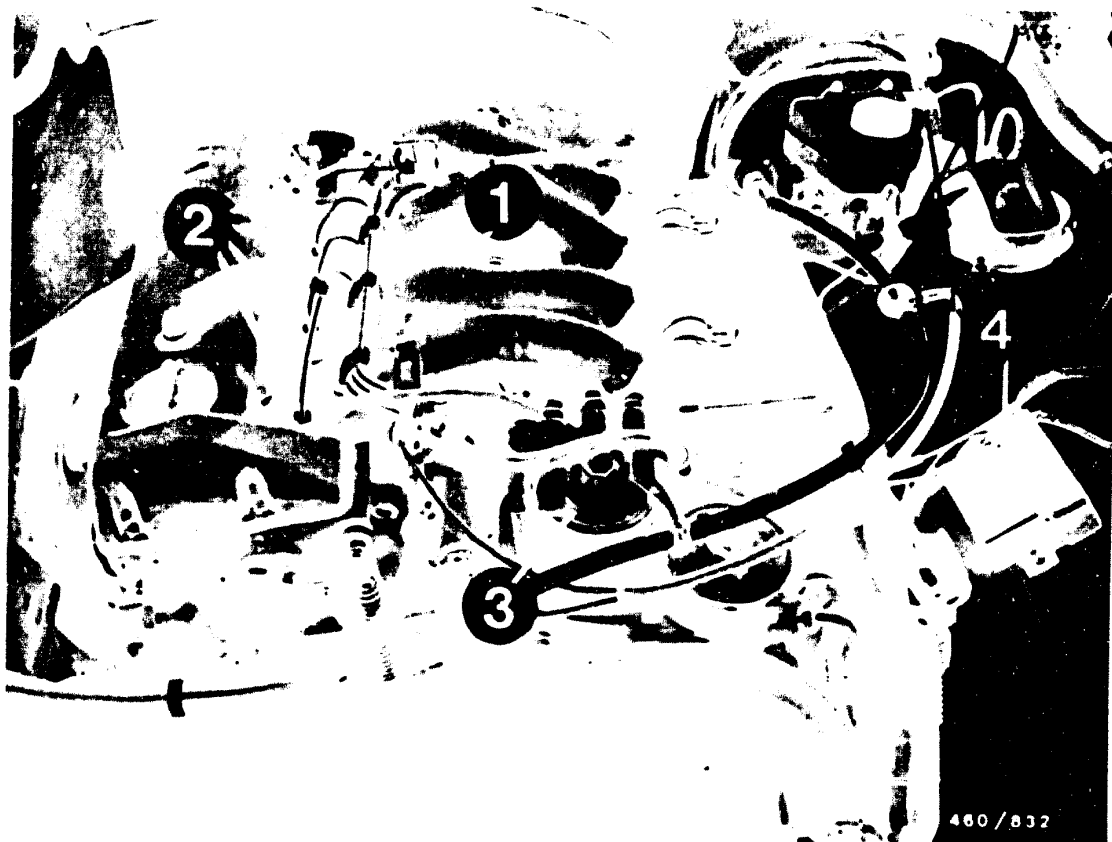
Test equipment and tools

MB 200 D, 250 D, 300 D (W124)



Description	Part number	Use
Test resistor 2.5 k Ω	102 589 056 300 (D.B. branch)	Testing temperature sensor
Pressure-vacuum tester	ETT 007.01	Testing vacuum shutoff
Holding device	KDEP 1077	Locking flyweight
TDC pickup Engine 601 Engine 602 Engine 603	601 589 042 100 (D.B. branch) 603 589 002 100	Adjusting of idle speed
Diesel-engine tester and adapter lead special accessories: Governor pulse generator TDC pickup Engine 601 Engine 602 603	ETD 019.00 1 684 463 147 617 589 102 100 601 589 042 100 (D.B. branch) 603 589 002 100 (D.B. branch)	Dynamic start-of-delivery test
Tachometer (photoelectric)	Commercially available	Adjusting idle speed
Multimeter with digital display	Commercially available	Checking pre-heating system
Special wrench for injection line	Hazet 329 - 2 AF14	Loosening injection lines
Puller	KDEP 1573	Pulling off servo-magnet





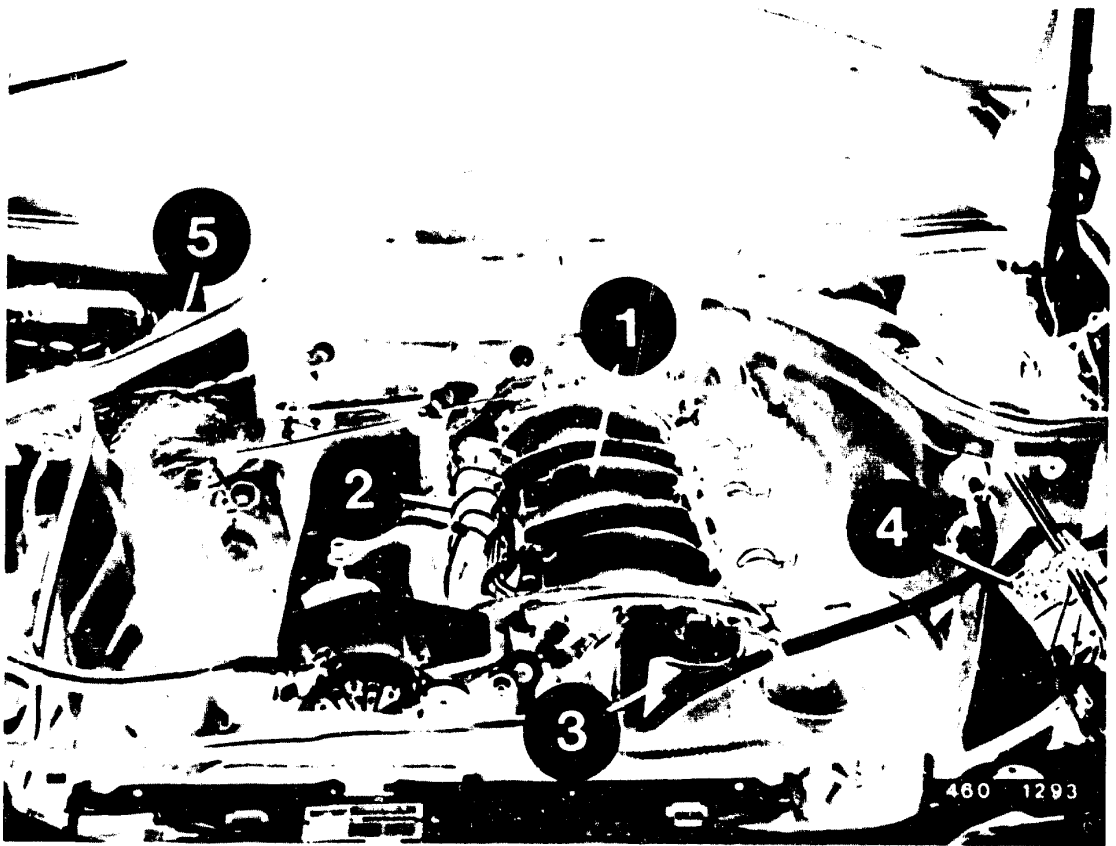
6. Installation position of components

- 1 = Injection pump (not visible in picture)
- 2 = Injection nozzles
- 3 = Fuel filter
- 4 = Glow-duration unit

6. Installation position of components

(Engine 601 - 4-cylinder)



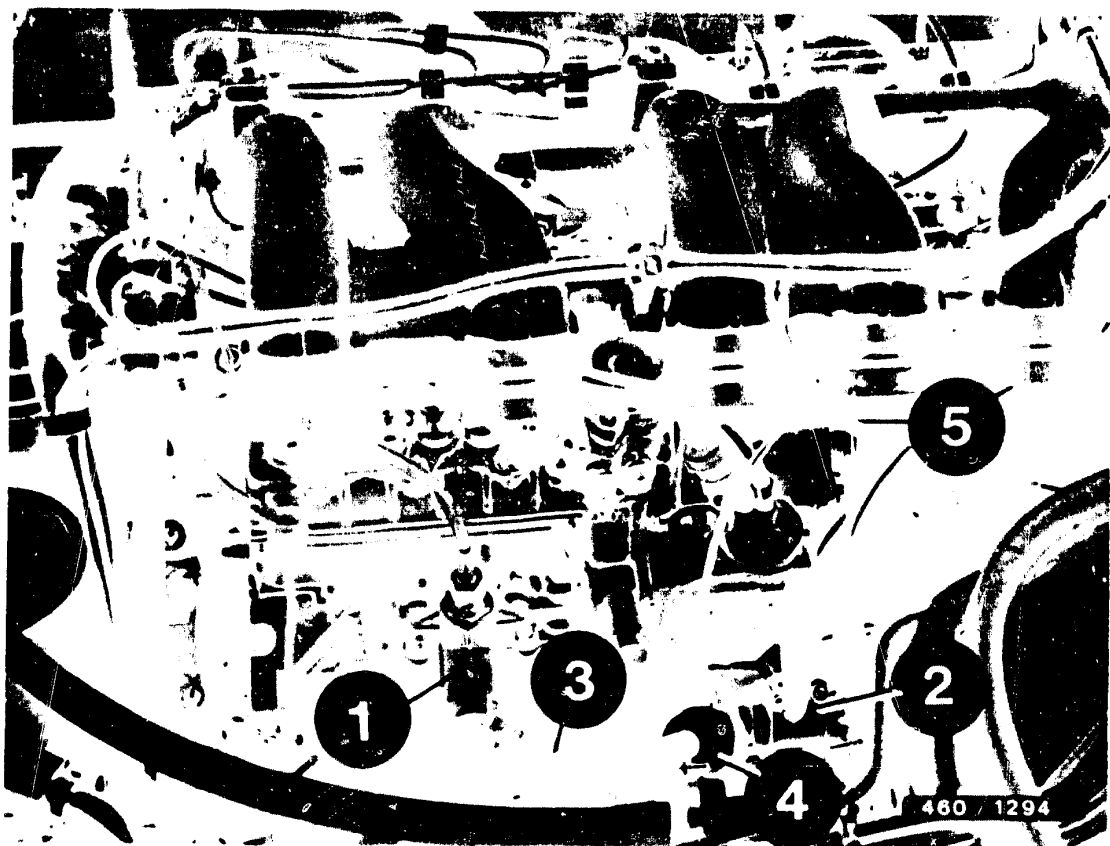


- 1 = Injection pump (not visible in picture)
- 2 = Injection nozzles
- 3 = Fuel filter
- 4 = Glow-duration unit
- 5 = Control unit of electronic idle control (ELR)

Engine 603 6-cylinder (engine 603 - 5-cylinder similar layout)

Note: Overvoltage protection is next to control unit





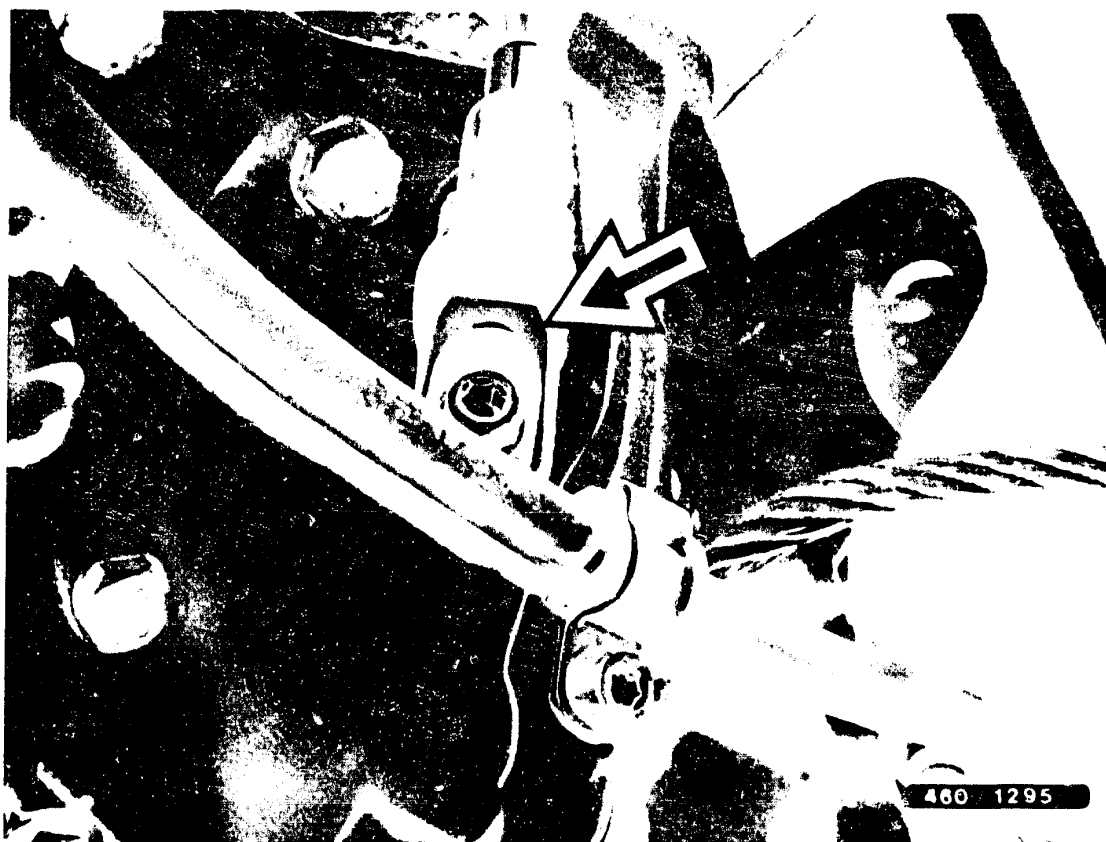
- 1 = Fuel-supply pump
- 2 = Fuel thermostat
- 3 = Intake line
- 4 = Fuel pre-filter
- 5 = Servomagnet

A15

Installation position of components

MB 200D, 250D, 300D (W 124)





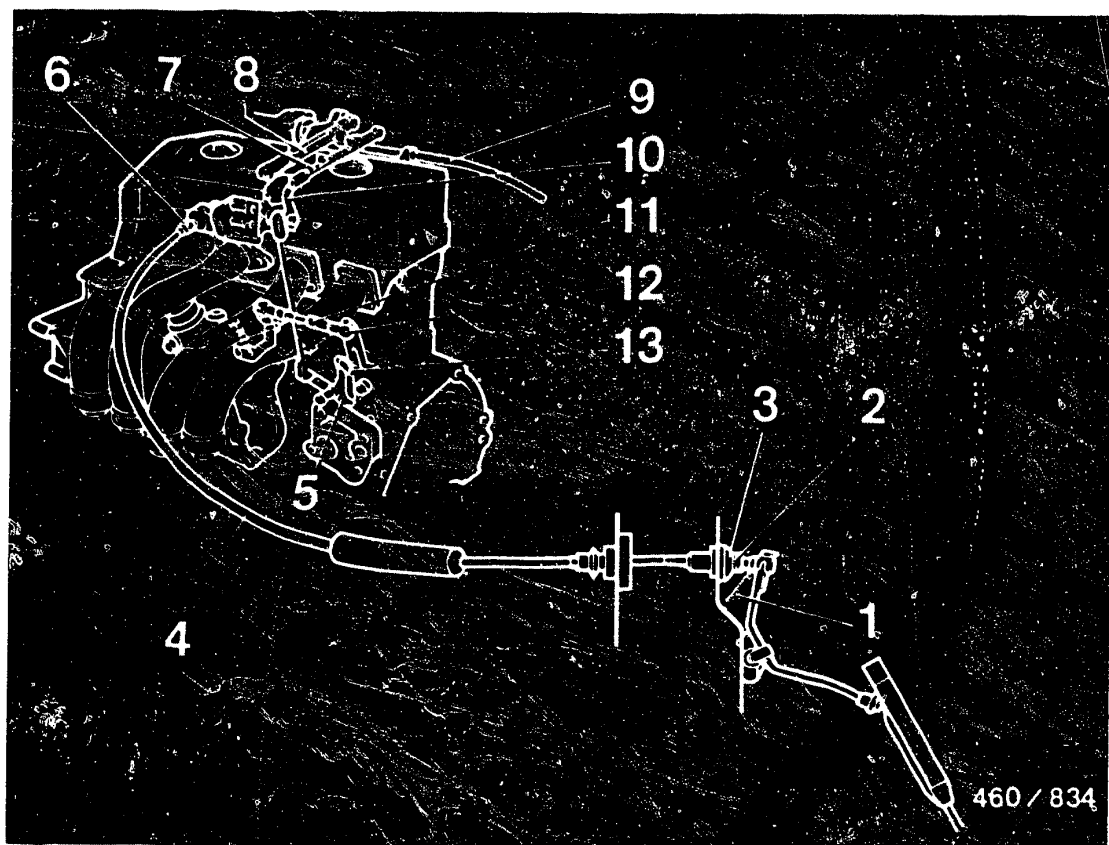
Engine-speed sensor is installed on flange to transmission (see picture, arrow).

A16

Installation position of components

MB 200D, 250D, 300D (W 124)





- 1 = Return spring
- 2 = Adjusting nut
- 3 = Rubber grommet
- 4 = Bowden cable
- 5 = Variable-fulcrum lever (automatic transmission only)
- 6 = Adjusting screw
- 7 = Idle travel rod
- 8 = Connecting rod
- 9 = Control pressure cable for automatic transmission
- 10 = Bell crank
- 11 = Connecting rod
- 12 = Ball head
- 13 = Roller

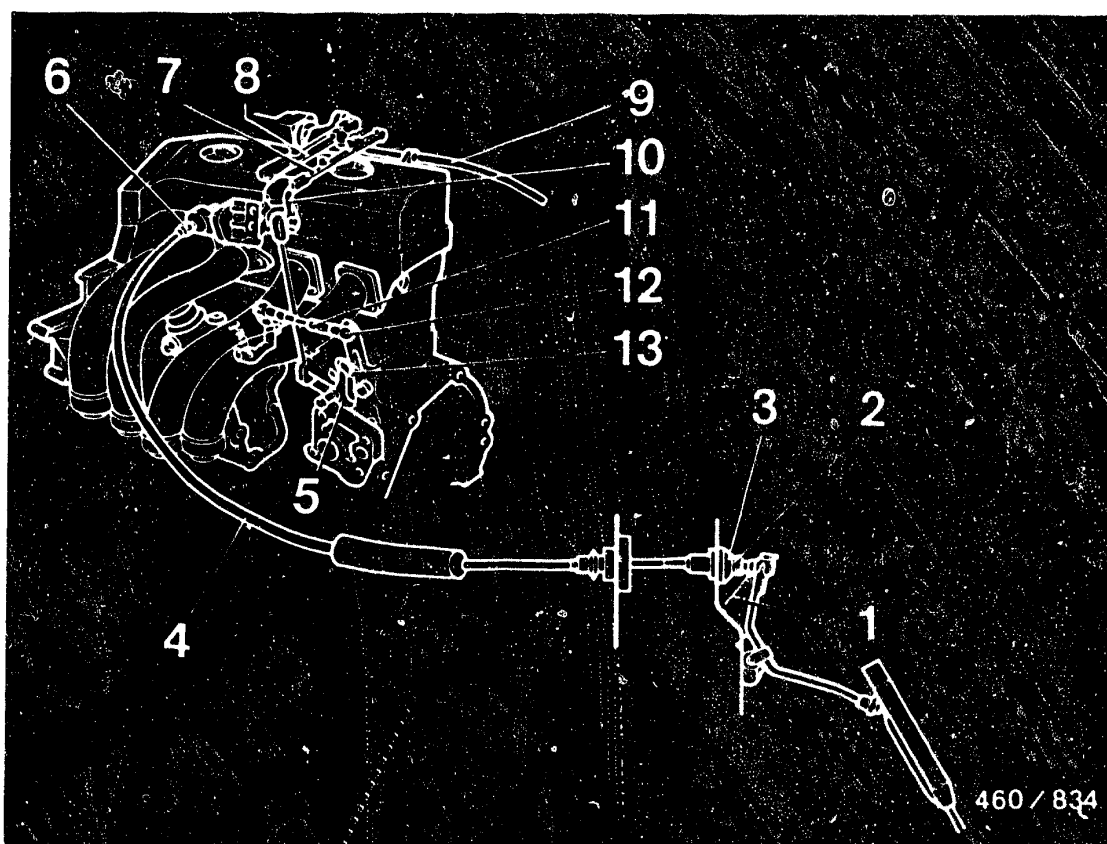
7. Set engine-speed regulation

A17

Engine-speed regulation

MB 200D, 250D, 300D (W 124)





The engine-speed regulation is set at the connecting rod (11).

Setting dimension from centre of ball head to centre of ball head = 146 ± 8 mm

A18

Engine-speed regulation

MB 200D, 250D, 300D (W 124)



8. Trouble-shooting

Customer complaint (fault symptom)

1. Engine fails to start or starts only with difficulty when warm
2. Engine fails to start or starts only with difficulty when cold
3. Engine hunts at idle
4. Rough idle with engine warm
5. Idle speed too high/too low
6. Engine missing during vehicle operation (part load)
7. Unsatisfactory performance
8. Engine bucking at full load

								Cause	Coordinates
●	●				●	●		Tank empty; tank vent clogged	B 9
●	●	●	●		●	●		Injection sequence does not correspond to firing sequence	B 11
	●				●			Heavy paraffin deposits in filter	B 12
●	●		●		●	●	●	Air in fuel system	B 14
●	●		●		●	●	●	Connections loose; lines leaking or broken	B 14
●	●				●	●		Supply lines clogged	B 14
●	●		●		●			Injection lines clogged or constricted	B 17
						●	●	Engine air filter clogged	C 1
		●	●	●				Idle speed incorrect	C 2
	●			●				Check pneumatic idle increase (PLA)	C 2
	●			●				Check electronic idle-speed control (ELR)	C 19
		●	●					Adjust accelerator control linkage	D 8

B1

Trouble-shooting

MB 200D, 250D, 300D (W 124)

**B2**

Trouble-shooting



Customer complaint (fault symptom) (continued)

1. Engine fails to start or starts only with difficulty when warm
 2. Engine fails to start or starts only with difficulty when cold
 3. Engine hunts at idle
 4. Rough idle with engine warm
 5. Idle speed too high/too low
 6. Engine missing during vehicle operation (part load)
 7. Unsatisfactory performance
 8. Engine bucking at full load

								<u>Cause</u>	<u>Coordinates</u>
●	●							Check vacuum system	D 17
●	●		●		●	●	●	Injection nozzle defective	D 22
●	●				●	●	●	Fuel filter overflow valve clogged	E 5
●	●				●	●	●	Check fuel-supply pump	E 7
	●							Pre-heating system defective	E 8
					●			Compression poor or uneven	F 5
●	●		●		●	●	●	Check/adjust injection timing	H 14
						●	●	Timing device defective	F 3
						●		Maximum speed incorrectly set (remove fuel-injection pump)	F 15
●	●	●	●	●	●	●	●	Injection pump (governor) defective or out of adjustment (remove fuel-injection pump)	F 15

B3

Trouble shooting

MB 200D, 250D, 250D, 300D (W 124)



B4

Trouble-shooting

MB 200D, 250D, 300D (W 124)



Customer complaint (fault symptom) (Continued)

9. Fuel consumption too high

10. Engine will not stop or stops only after a delay

11. Engine runs rough, black smoke in full-load range; lack of power

12. Fog-like smoke in full-load range (white)

13. Incorrect engine speeds

14. Engine will not accelerate when cold

15. Idle speed too low with engine cold

16. Injection pump overheating

								Cause	Coordinates
			●		●			Engine empty; tank vent clogged	B 9
		●	●		●			Injection sequence does not correspond to firing sequence	B 11
						●		Heavy paraffin deposits in filter	B 12
			●		●			Air in fuel system	B 14
●		●	●		●			Connections loose; lines leaking or broken	B 14
							●	Supply lines clogged	B 14
		●						Injection lines clogged or constricted	B 17
●		●						Engine air filter clogged	C 1
				●				Idle speed incorrect	C 2
				●				Check pneumatic idle increase (PLA)	C 2
						●		Check electronic idle-speed control (ELR)	C 19
						●		Adjust accelerator control linkage	D 8



Customer complaint (Fault symptom) (Continued)

9. Fuel consumption too high							
10. Engine will not stop or stops only after a delay							
11. Engine runs rough, black smoke in full-load range; lack of power							
12. Fog-like smoke in full-load range (white)							
13. Incorrect engine speeds							
14. Engine will not accelerate when cold							
15. Idle speed too low with engine cold							
16. Injection pump overheating							
Cause							Coordinates
	●						Check vacuum system D 17
●		●	●			●	Injection nozzle defective D 22
			●		●		Fuel filter/overflow valve clogged E 5
							Check fuel-supply pump E 7
							Pre-heating system defective E 8
		●	●				Compression poor or uneven F 5
●		●	●		●		Check/adjust injection timing H 14
●		●	●		●		Timing device defective F 3
					●		Maximum speed incorrectly set (remove fuel-injection pump) F 15
●	●	●	●	●	●	●	Injection pump (governor) defective or out of adjustment (remove fuel-injection pump) F 15

B7

Trouble-shooting

MB 200D, 250D, 300D (W 124)

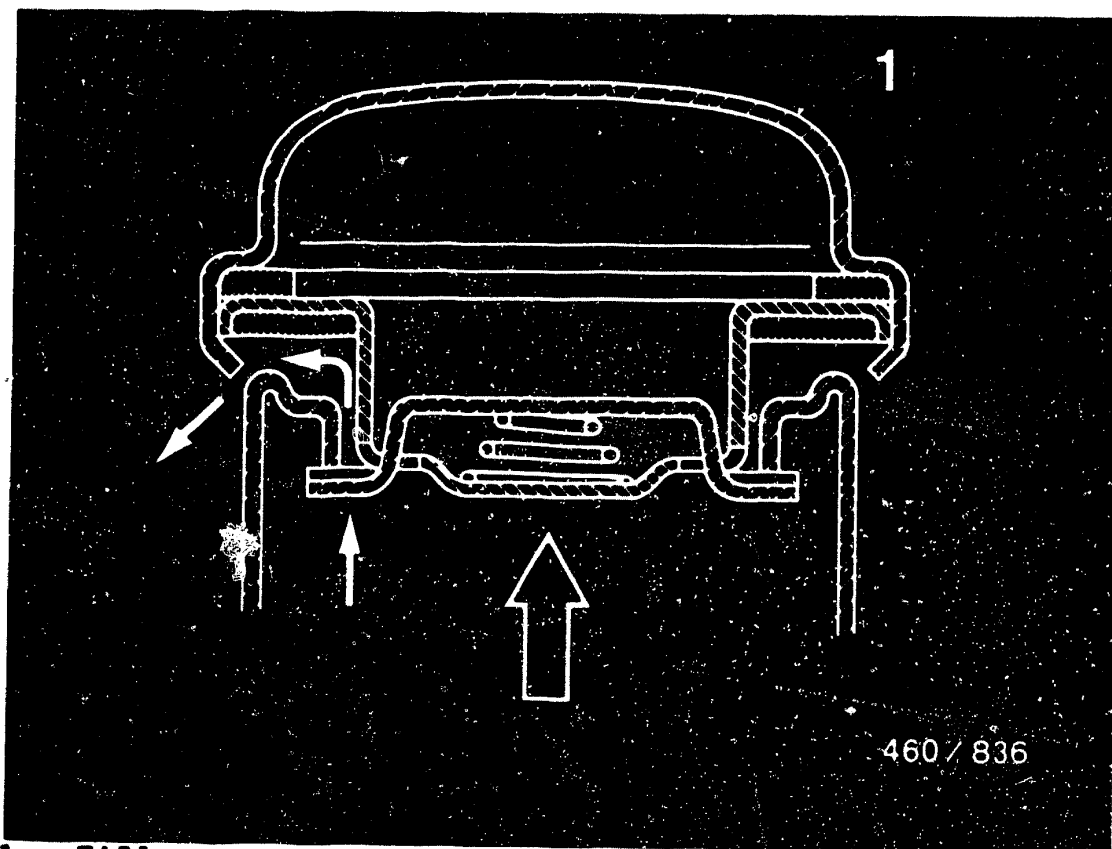


B8

Trouble-shooting

MB 200D, 250D, 300D (W 124)





1 = Filler cap

9. Check tank vent

Remove fuel filler cap.

If customer complaint disappears after removing filler cap, test ventilation system (filler cap and ventilation valve).

Note:

At 100 - 300 mbar gauge pressure, the fuel evaporation gases can escape through the filler cap.

B9

Check tank vent

MB 200D, 250D, 300D (W 124)



Test ventilation line of ventilation valve for clogging.

Ventilation line runs from central pipe downward through the fuel tank.

The ventilation valve is connected to the end of the ventilation line.

B 10

Check tank vent

MB 200D, 250D, 300D (W 124)





10. Check routing of fuel-injection tubing

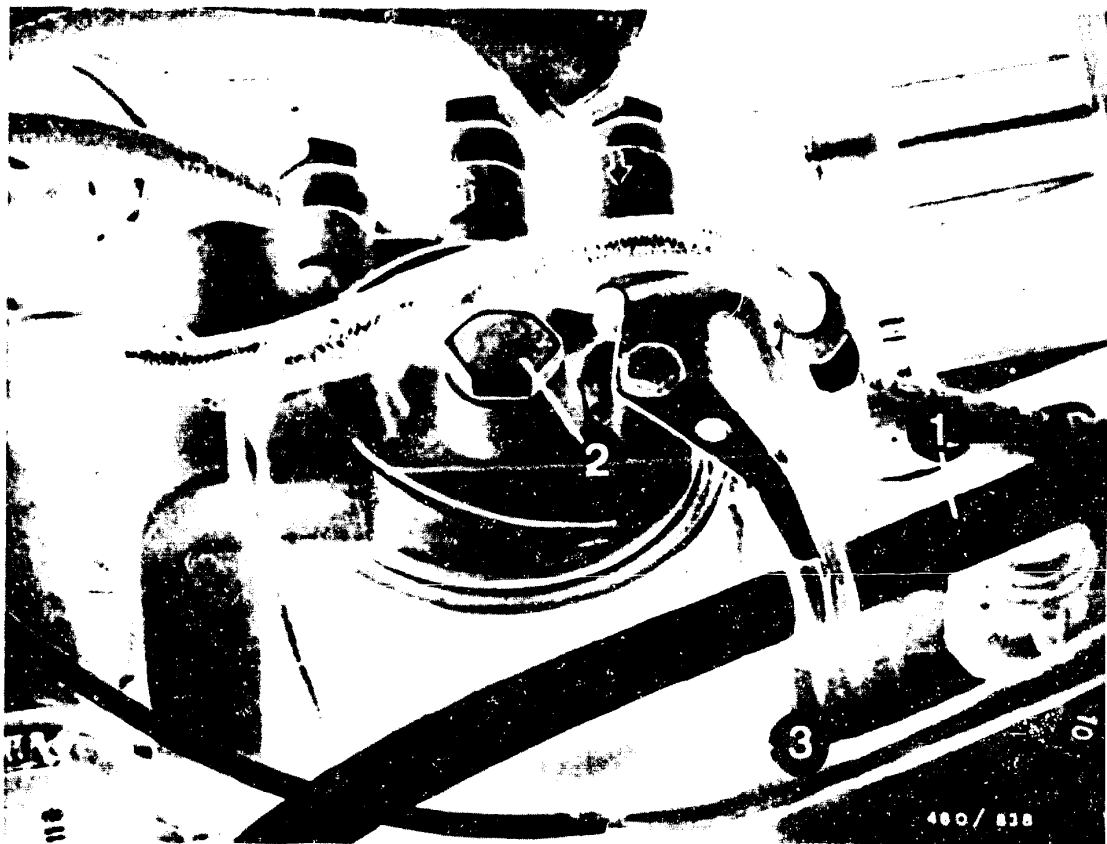
The fuel-injection lines are connected together by means of plastic clips (see picture, arrows) so that it is impossible to mix up the outlets.

If, nevertheless, there is doubt, check the routing of the lines according to the above picture.

B11

Check routing of fuel-injection tubing
MB 200D, 250D, 300D (W 124)





- 1 = Vacuum line
- 2 = Fastening screw for filter
- 3 = Filter

11. Renew filter box

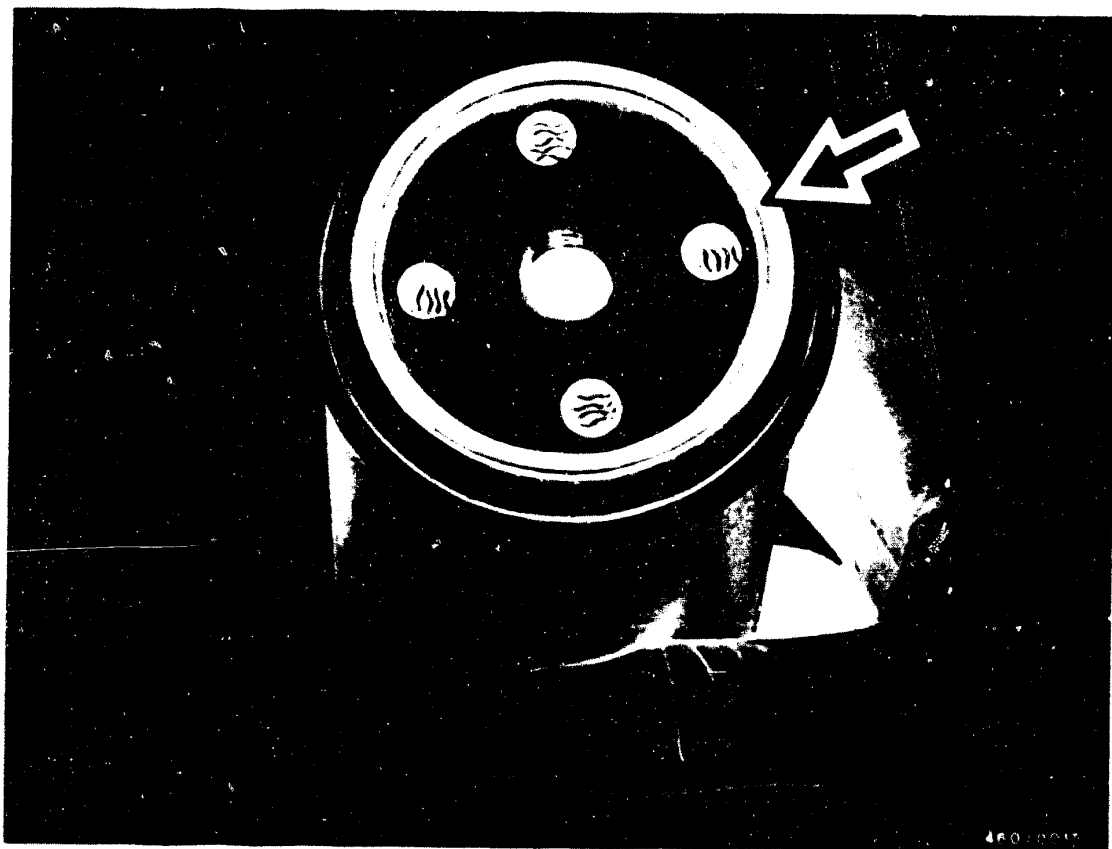
Unhook vacuum line.

Loosen fastening screw and remove filter downward.

B12

Replace filter box
MB 200D, 250D, 300D (W 124)





Rub diesel fuel into rubber seal (see picture, arrow) of new filter box.

Screw filter box by hand into the cover and tighten. Test fuel filter for leaks (visual examination).

B 13

Renew filter box

MB 200D, 250D, 300D (W 124)





12. Test fuel-injection system for leaks

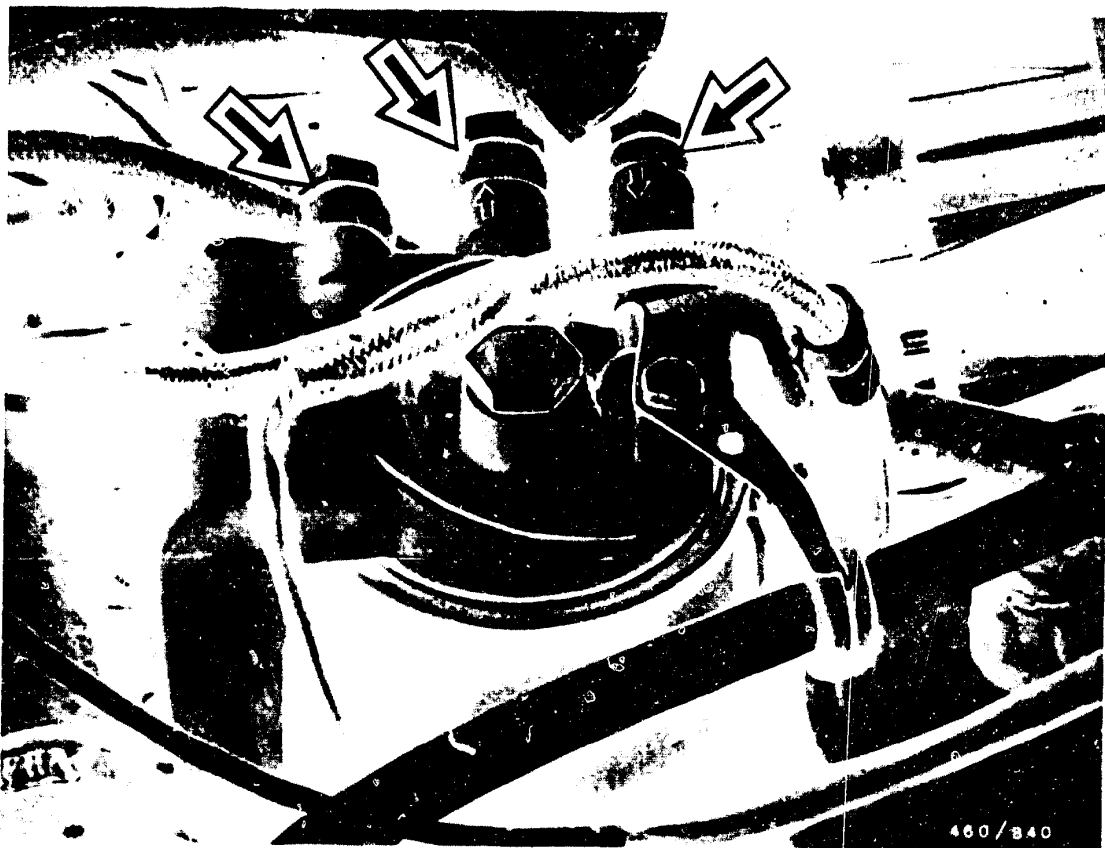
Leak test to be performed with engine at normal operating temperature.

Visually examine all connection points of fuel lines.

Pay particular attention to:

- connections of nozzle-holder assemblies (see picture, arrows).



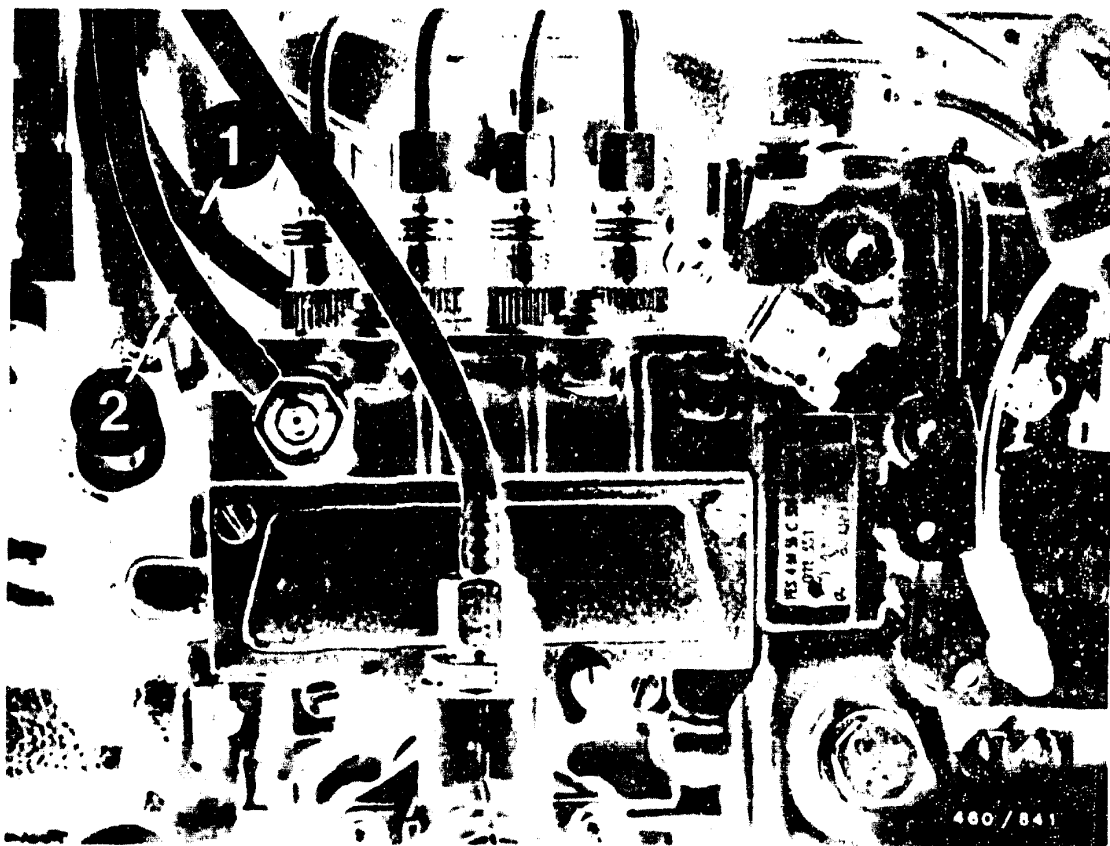


- Connections on fuel filter (see picture, arrows).

B 15

Test fuel-injection system for leaks
MB 200D, 250D, 300D (W 124)





1 = Fuel inlet line
2 = Fuel return line

- Delivery-valve holders on the individual outlets
- Hairline cracks on fuel lines
- Inlet line and return line on injection pump





13. Test fuel lines

Perform visual examination of suspect fuel lines.

If crushing or kinking is detectable, remove the fuel line in question.

Test fuel line for throughflow with compressed air and clean if necessary.

For blowing through the fuel lines, it is possible to use a suitable piece of hose to seal off the line at the sides.



14. Smoke test - check air filter

14.1 Smoke test

Summary of the contents of the legal regulations (as at April 1978). Applicable to the Federal Republic of Germany.

This regulation applies only to the homologation of motor vehicles having at least 4 wheels with a maximum permissible speed of more than 25 km/h. A smoke emission test is not prescribed for official general inspections.

Parts which may have an influence on environmental pollution must be designed in such a way that the legal requirements are met during operation and despite vehicle vibration.

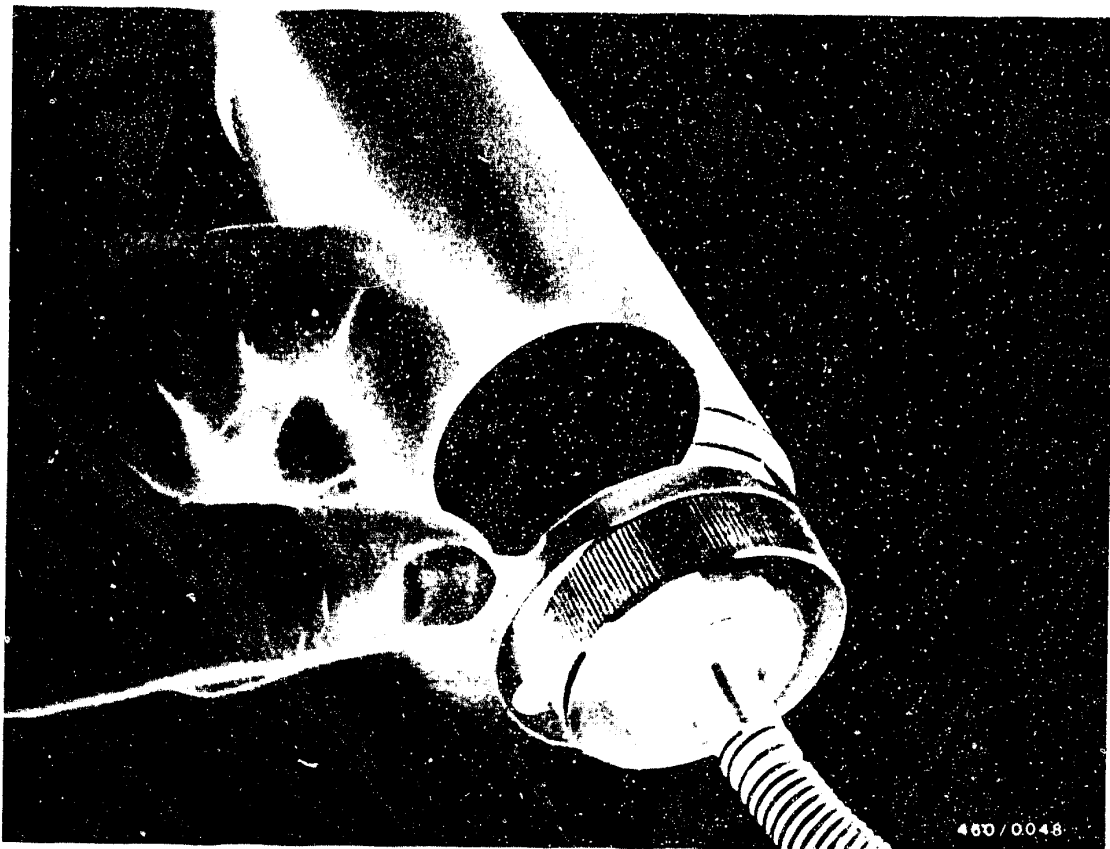
This applies in particular to cold-start devices and full-load stops. The Rheinland-Westfälische TÜV (Technical Inspection Bureau of Rhineland-Westfailla) in Essen is the sole approval agency.

B 18

Smoke test

MB 200D, 250D, 300D (W 124)





14.1.1 Test setup

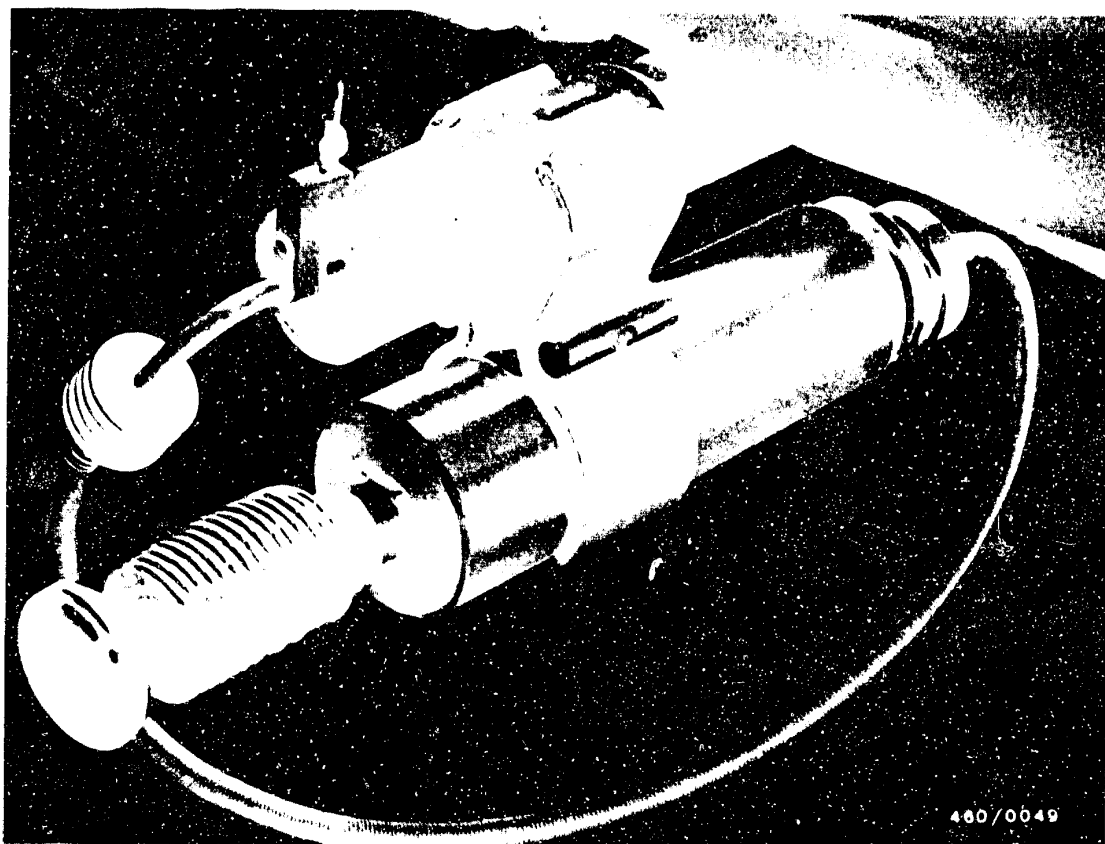
The smoke test is conducted using the BOSCH smokemeter.
The smokemeter consists of the following units:

Accessories box with proportioning pump 0 681 169 038

Evaluating unit 0 684 102 050

Insert filter plate into proportioning pump.





Mount sampling pump on exhaust pipe using appropriate clamp.

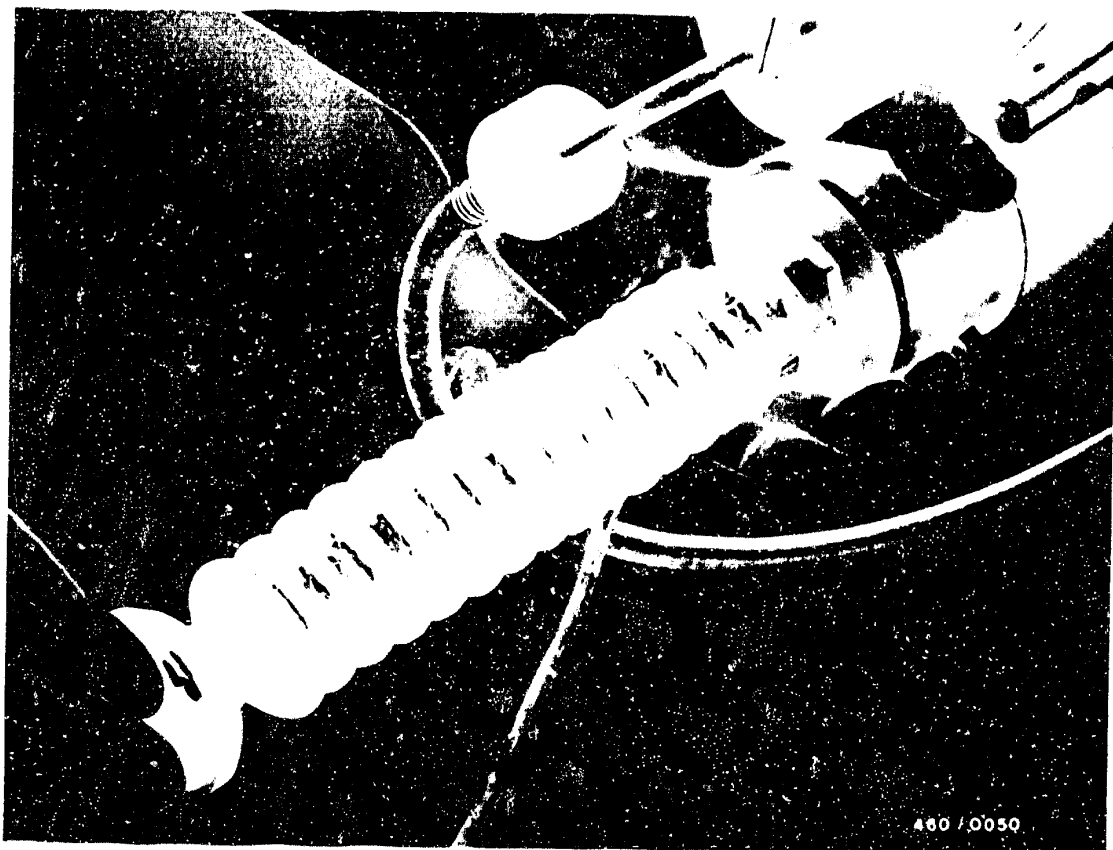
Introduce exhaust-sample pickup as far as possible into exhaust pipe and clamp in position.

B20

Smoke test

MB 200D, 250D, 300D (W 124)





14.1.2 Test procedure

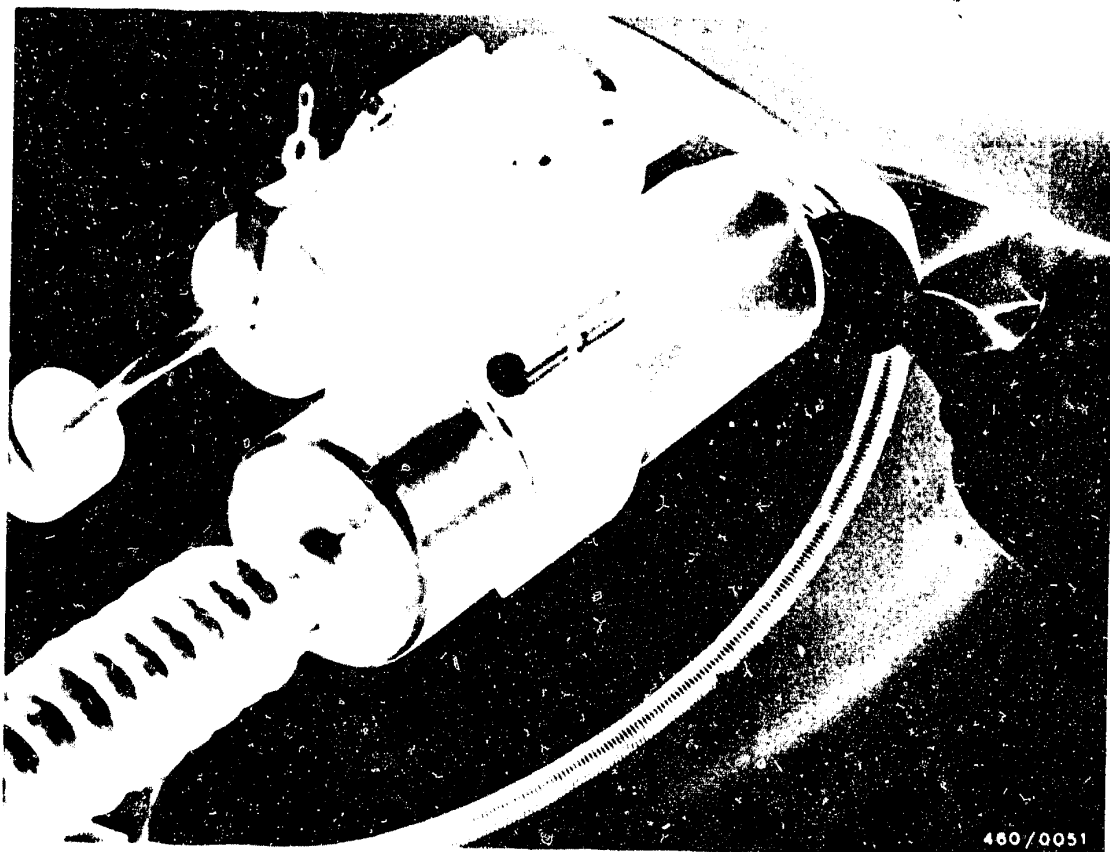
Set proportioning pump by pressing in the black push-button. Take rubber ball on triggering hose and enter passenger compartment.

The test can be performed on the chassis dynamometer or on the road (gradient). (The chassis dynamometer is preferable).

Select any gear and "drive flat out". Establish the maximum possible speed. With the accelerator in the same position, load the engine by 40% so that 60% of the maximum speed is reached. Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

Switch off engine.





Warning!

During the following operation, remember that the exhaust pipe has been heated up by the running of the engine.

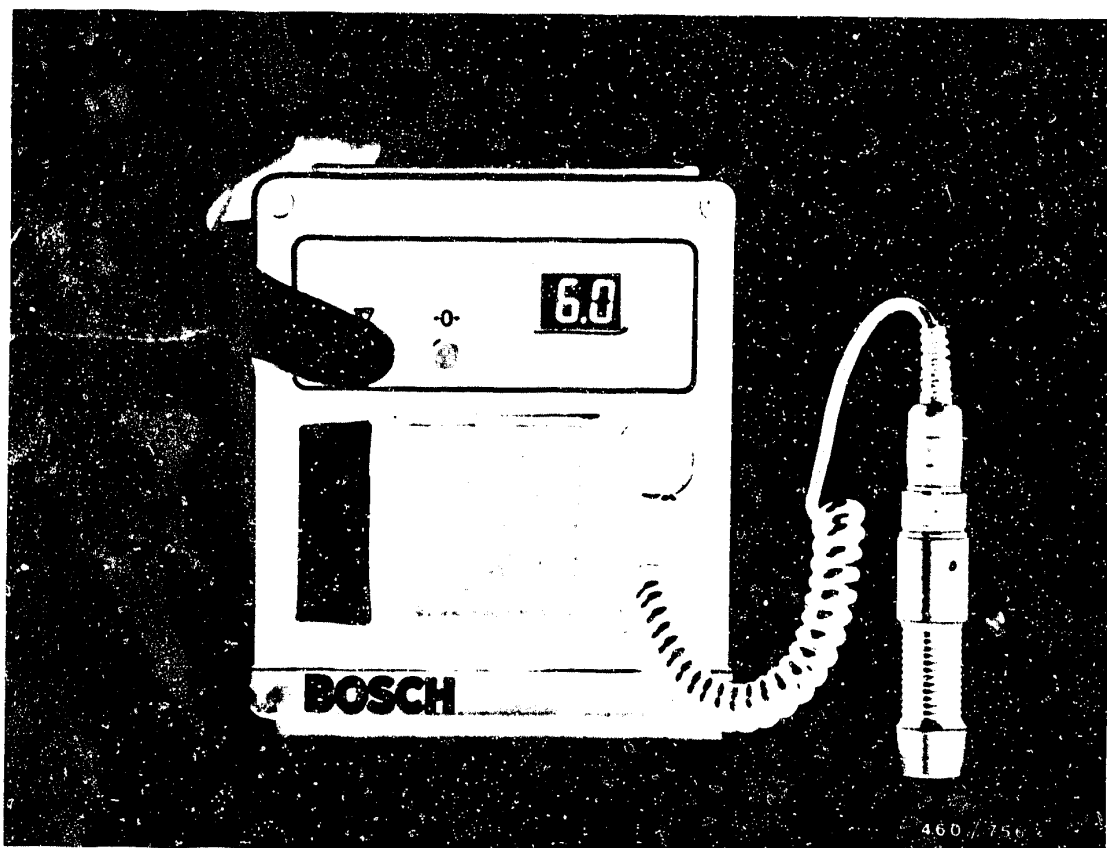
Remove filter plate from metering unit.

B22

Smoke test

MB 200D, 250D, 300D (W 124)





Setting the zero point

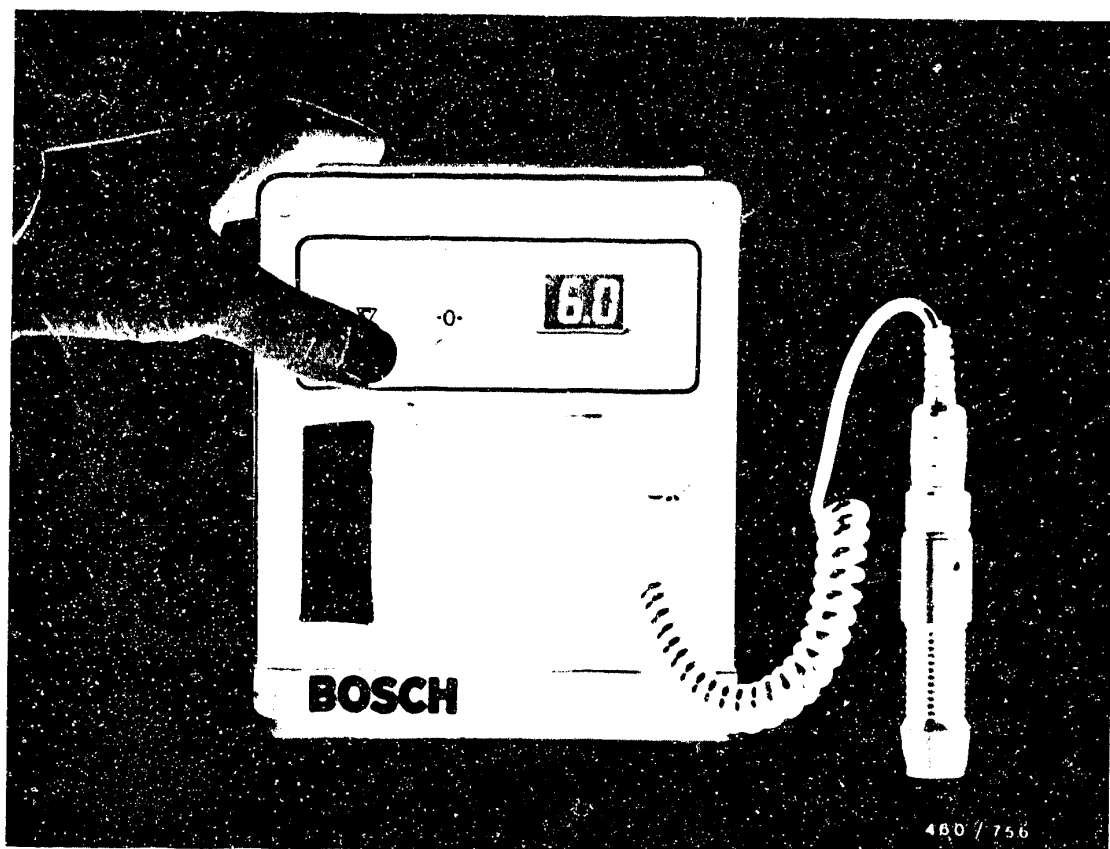
The zero point adjustment must be performed

- before each series of measurements
- in case of changes in ambient conditions
- whenever the lens of the photoelement adapter has been cleaned.

Firmly press measuring head of photoelement adapter onto 5 clean white filter plates placed one on top of the other.

Press button "0" until display 0.0 appears.
Release button "0".





Measuring

Place filter plate from sampling pump - with sooted side to the top - on 3 new filter plates placed one on top of the other.

Press measuring head vertically onto black surface of filter plate, simultaneously pressing button "C" until the measured smoke number appears on the display.

Note:

Measuring head must be firmly pressed down both for the zero point adjustment as well as when measuring (even slight tilting can lead to incorrect measurements).

Compare smoke number with evaluation sheet.

Note kW (hp-din) data of vehicle manufacturer.



14.2 Check air filter

Remove air filter and subject to a visual inspection.

Test criteria for air filter:

- dusty air filter
- oiled-up air filter
- solid matter in air filter, e.g. leaves

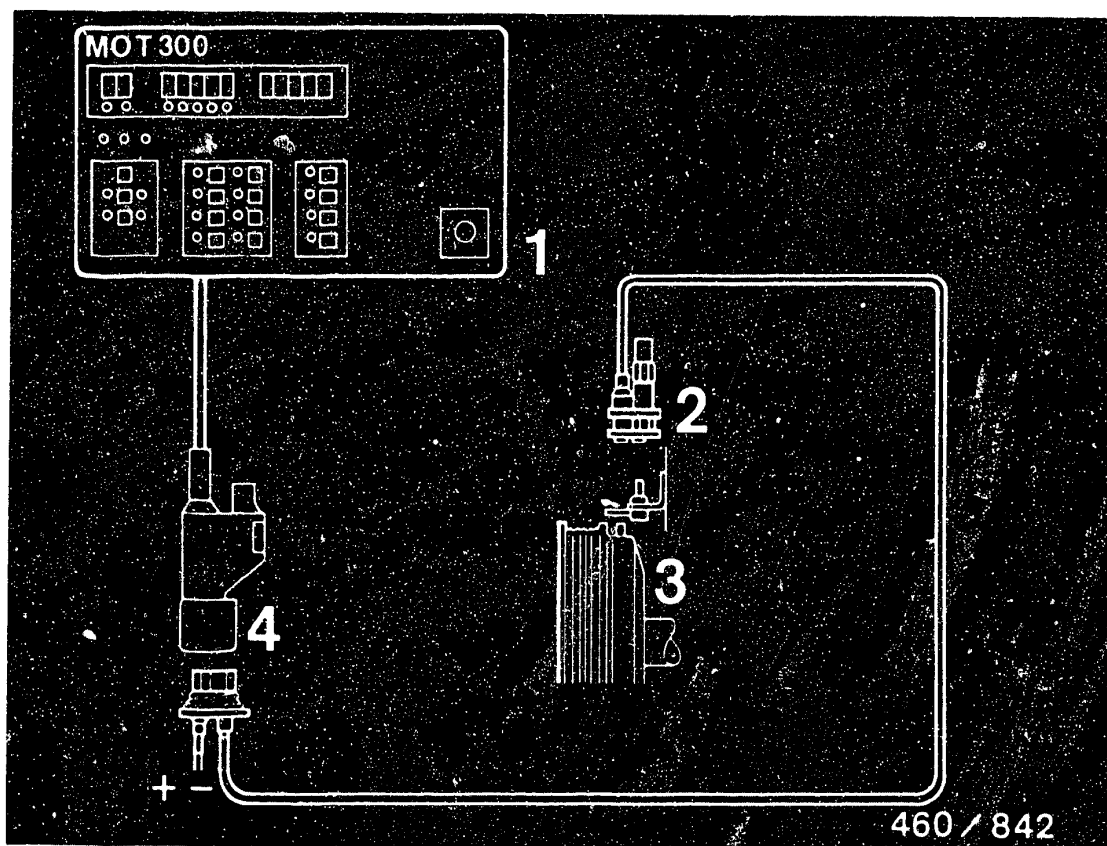
If in doubt, use new filter element.

C1

Smoke test - check air filter

MB 200D, 250D, 300D (W 124)





- 1 = Motortester
2 = TDC pickup
3 = Crankshaft pulley
4 = Adapter lead

15. Checking and adjusting idle speed with motortester or with diesel-engine tester on engine 601 and 602 with pneumatic idle increase (PLA).
(Engine 603 is not equipped with PLA)

Necessary test equipment:

TDC pickup for engine 601 DB Part No. 601 589 042 100
(if necessary, obtain through DB branch)

TDC pickup for engine 602 DB Part No. 603 589 002 100
(if necessary, obtain through-DB branch)

Adapter lead for motortester (e.g. MOT 300):

1 684 463 094

Adapter lead for diesel-engine tester (ETD 019):

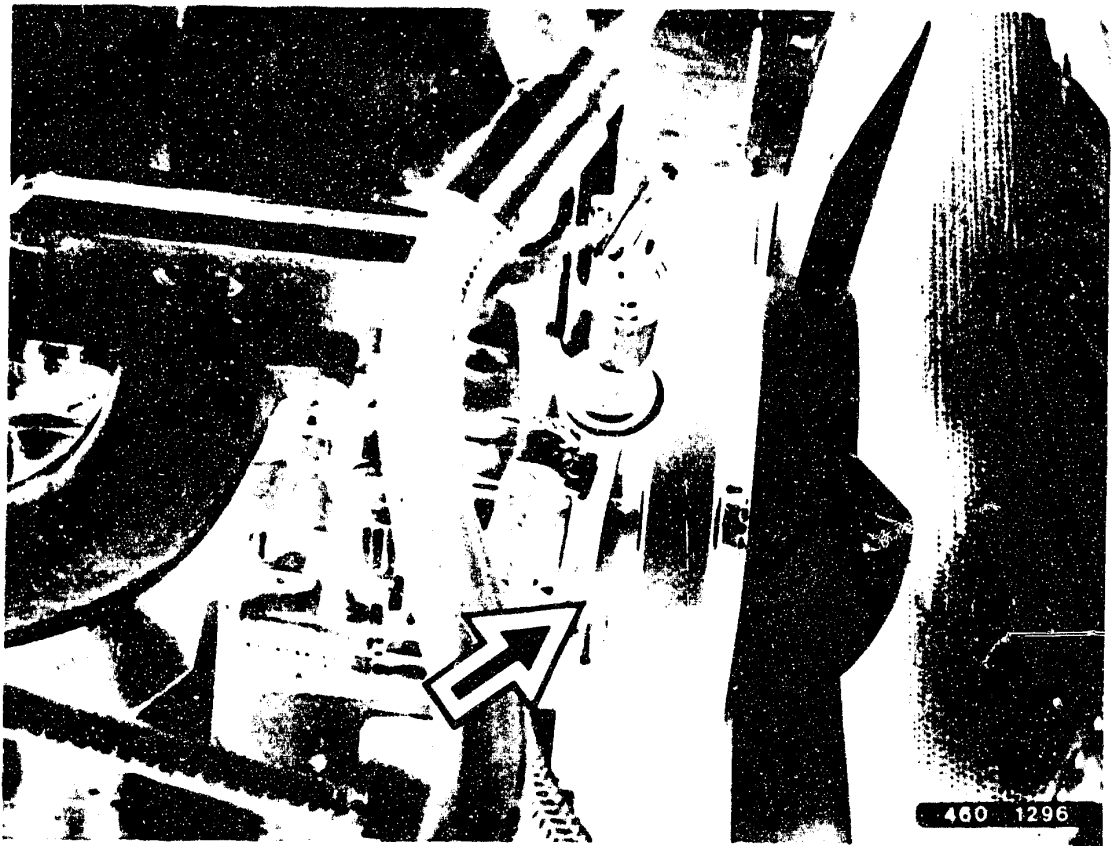
1 684 463 147

C2

Adjust idle speed

MB 200D, 250D, 300D (W 124)





Installation position of TDC pickup mounting

Engine 601: on left at front on engine block

Engine 602/603: on right at front on engine block
(see picture (arrow)).

C3

Adjust idle-speed

MB 200D, 250D, 300D (W 124)



Test the mechanics of the engine-speed regulation for freedom of movement and wear.

For adjusting the idle speed, the engine must be at normal operating temperature (coolant temperature 60°C - 80°C).

Note:

If a TDC pickup is not available, establish engine speed using commercially available tachometer (e.g. photo-electric).

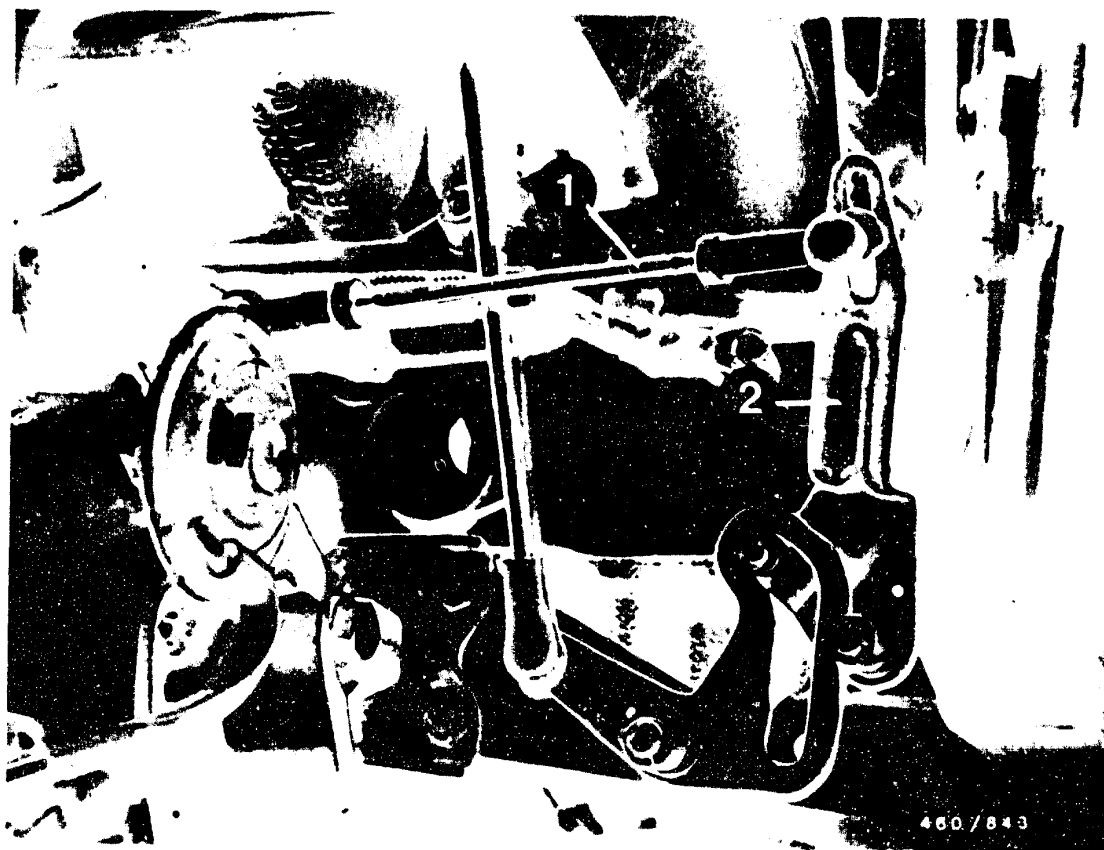
To do this, attach reflecting mark on crankshaft. Aim digital manual tachometer at reflecting mark and sense engine speed optically.

C4

Adjust idle speed

MB 200D, 250D, 300D (W 124)





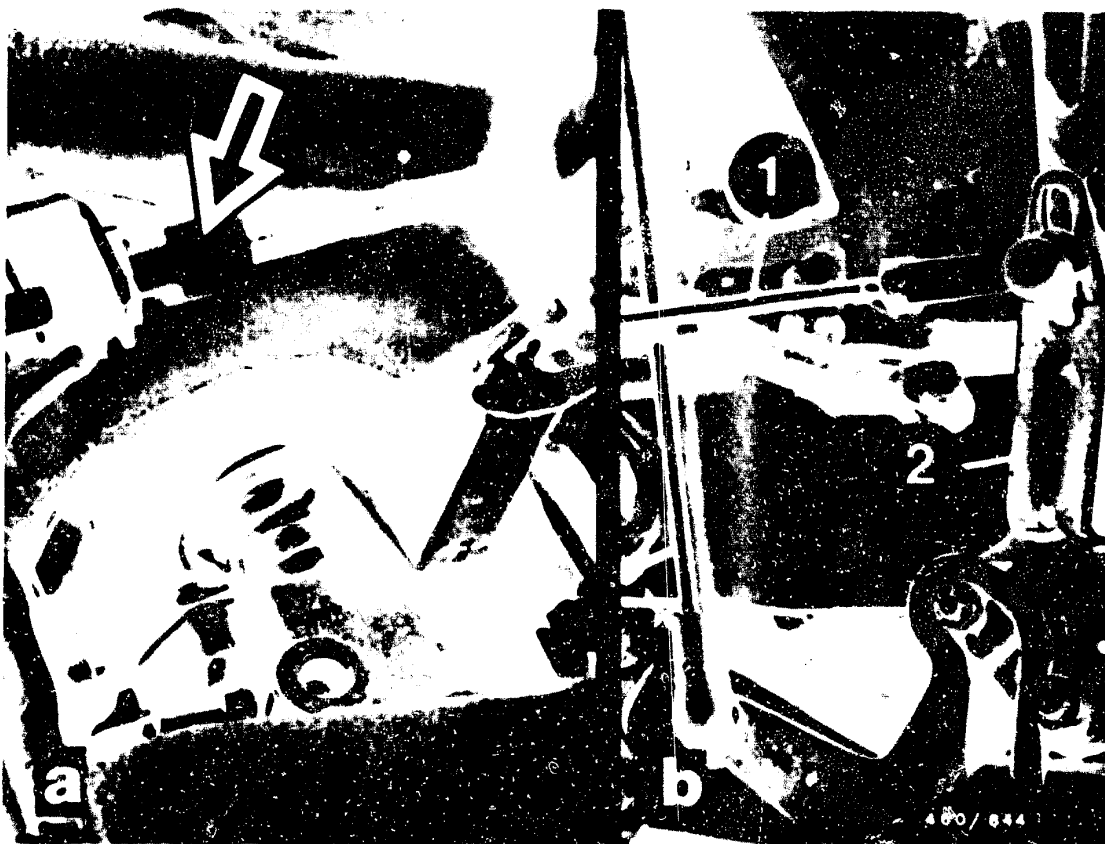
- 1 = Connecting rod
2 = Deflection lever

Unhook connecting rod on deflection lever.

C5

Adjust idle speed
MB 200D, 250D, 300D (W 124)





Check idle-speed.

Idle-speed with PLA should be:

Engine 601: 700 - 800 min⁻¹
 Engine 602: 650 - 750 min⁻¹

If correction is necessary, proceed as follows:

Loosen vacuum unit lock nut (see picture a)
 and adjust idle speed by turning the vacuum unit.

Hook connecting rod (1) into deflection lever (2) so
 that it is free of tension. Setting dimension from
 centre of ball head to centre of ball head = 146 ± 8 mm.

Switch on all electrical auxiliary units and check
 whether engine still idles smoothly.

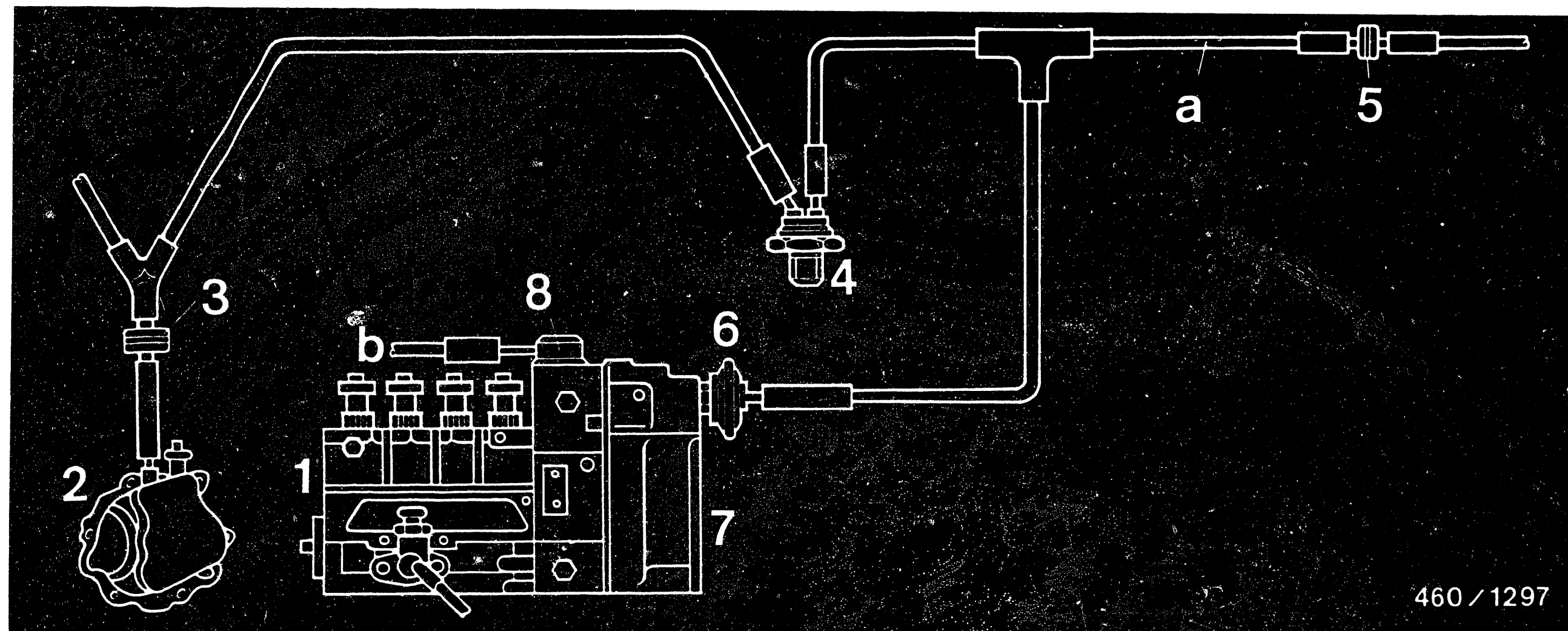
If necessary, adjust at cable adjusting screw (see
 arrow, picture a).

C6

Adjust idle-speed

MB 200D, 250D, 300D (W 124)





460 / 1297

1 = Injection pump
2 = Vacuum pump
3 = Air-admission filter

4 = Thermo-valve (closes at approx. +30° C)

5 = Air-admission filter with restriction

6 = Idle-increase vacuum unit

7 = Governor

8 = Vacuum unit (shutoff unit)

a = Air line to passenger compartment

b = To key-operated shutoff

16. Check pneumatic idle-increase, engines 601 and 602 with manual transmission

Before performing this work, check idle-speed and, if necessary, correct to nominal speed by turning the vacuum unit.

Engine 601: 700 - 800 min⁻¹

Engine 602: 650 - 750 min⁻¹

16.1 Functional diagram of idle-increase on vehicles with manual transmission

C7

Check pneumatic idle-increase
MB 200D, 250D, 300D (W 124)



C8

Check pneumatic idle-increase
MB 200D, 250D, 300D (W 124)



16.3 Functional description of pneumatic idle increase PLA)

The idle increase in order to stabilize the engine speed is basically identical on vehicles with manual and automatic transmissions.

Up to approx. $+17^{\circ}\text{C}$ coolant temperature, the idle increase is operative (on vehicles with automatic transmission also above $+17^{\circ}\text{C}$ coolant temperature when the refrigerant compressor is switched on).

Note:

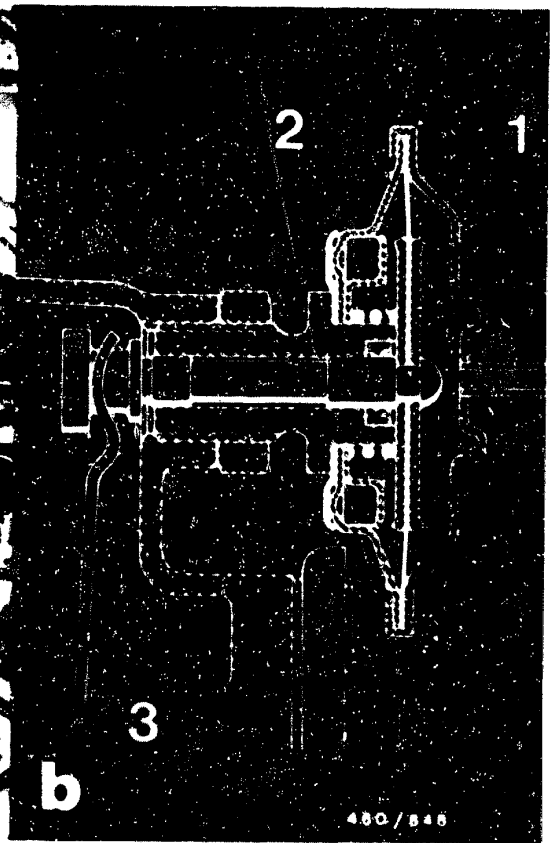
On vehicles with manual transmission, only one thermo-valve with $+30^{\circ}\text{C}$ is installed instead of the two $+17^{\circ}\text{C}$ thermo-valves.

C11

Check pneumatic idle increase

MB 2000, 2500, 3000 (W 124)





1 = Vacuum unit
2 = Ram

3 = Idle spring
4,5 = Thermo-valves

The vacuum unit on the governor housing is energized by the thermo-valves.

If vacuum (approx. 500mbar) is applied to the vacuum unit (1), the idle spring (3) is pulled in by the ram (2).

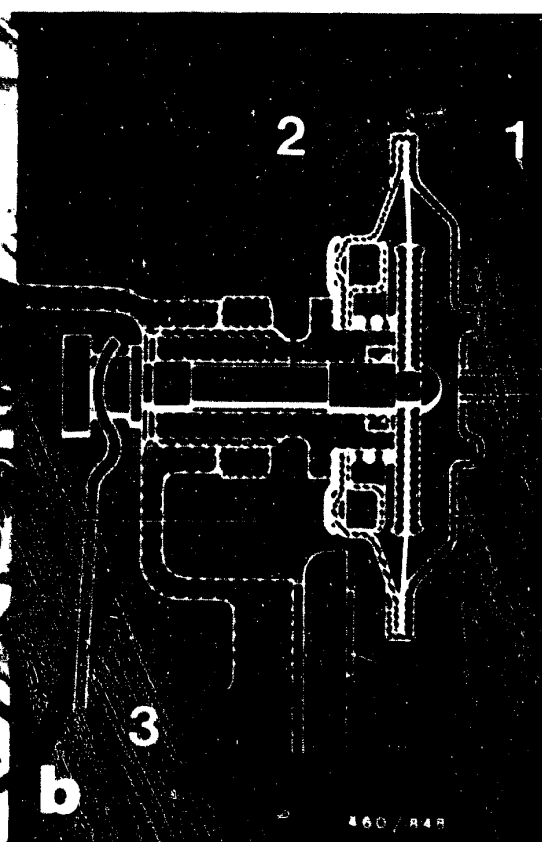
This shifts the idle characteristic, i.e. the idle speed is increased by approx. 100 min^{-1} .

C12

Check pneumatic idle increase

MB 200D, 250D, 300D (W 124)





1 = Vacuum unit
2 = Ram

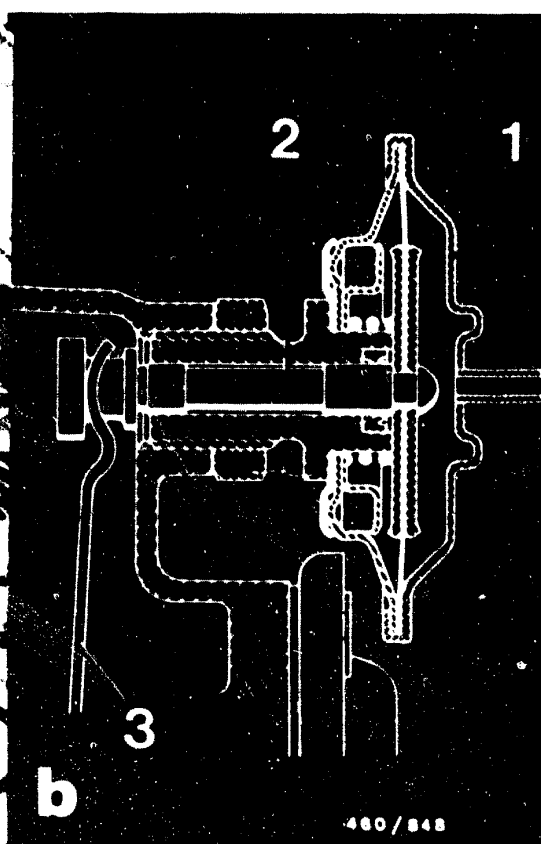
3 = Idle spring
4,5 = Thermo-valves

At coolant temperatures below approx. $+17^{\circ}\text{C}$ the thermo-valve (4) is open, and the thermo-valve (5) is closed. Thus, vacuum is applied to vacuum unit (1). The idle speed is raised.

C13

Check pneumatic idle increase
MB 200D, 250D, 300D (W 124)





1 = Vacuum unit
2 = Ram

3 = Idle spring
4,5 = Thermo-valves

At coolant temperatures above approx. $+17^{\circ}\text{C}$ the thermo-valve (4) is closed, and the thermo-valve (5) is open. Atmospheric pressure is applied to the vacuum unit (1) and the engine-speed increase is cancelled.

C14

Check pneumatic idle increase
MB 200D, 250D, 300D (W 124)



16.4 Testing (Vehicles with automatic transmission)

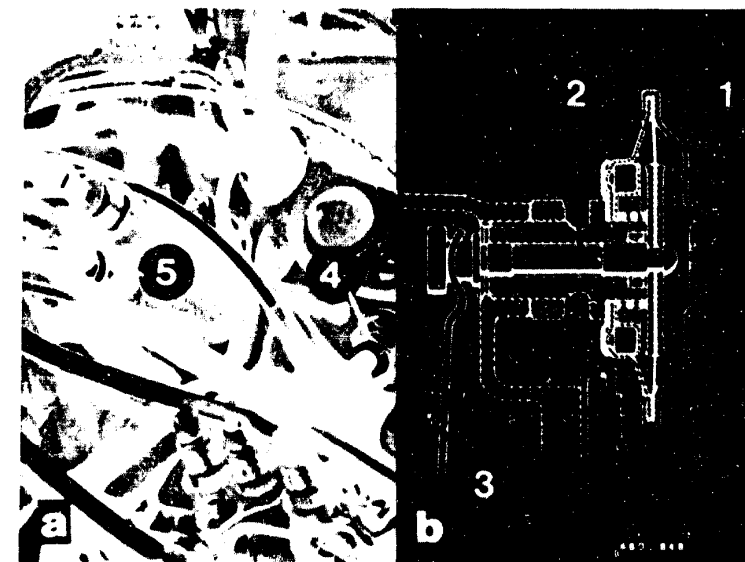
Engine idling.
Connect vacuum pump to straight connection of thermo-valve (5) and apply 500 mbar.
Engine speed must increase by approx. 100 min⁻¹.
Does engine speed increase by approx. 100 min⁻¹?

no

Test thermo-valves (4 and 5).
Thermo-valve (4) must open at coolant temperatures below approx. +17°C;
thermo-valve (5) must be closed.
If necessary, renew thermo-valve.

yes

Continued on C17/C18



- 1 = Vacuum unit
- 2 = Push rod
- 3 = Idle spring
- 4 = Thermo-valve
- 5 = Thermo-valve

C15

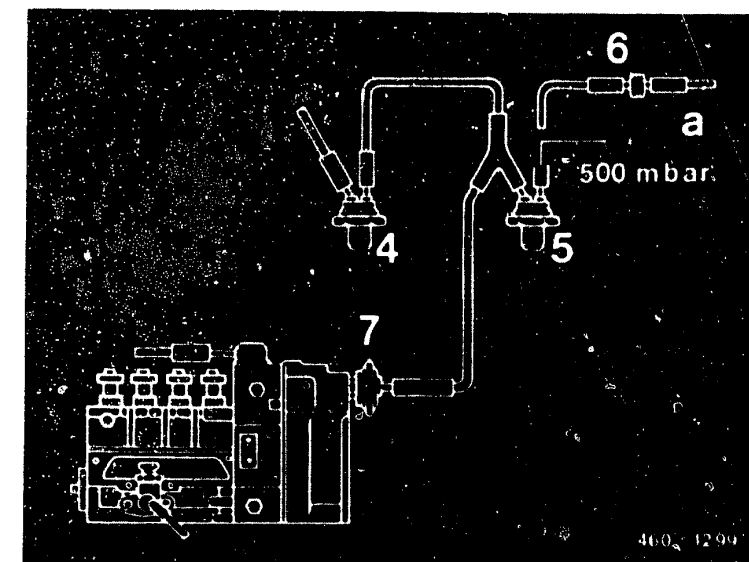
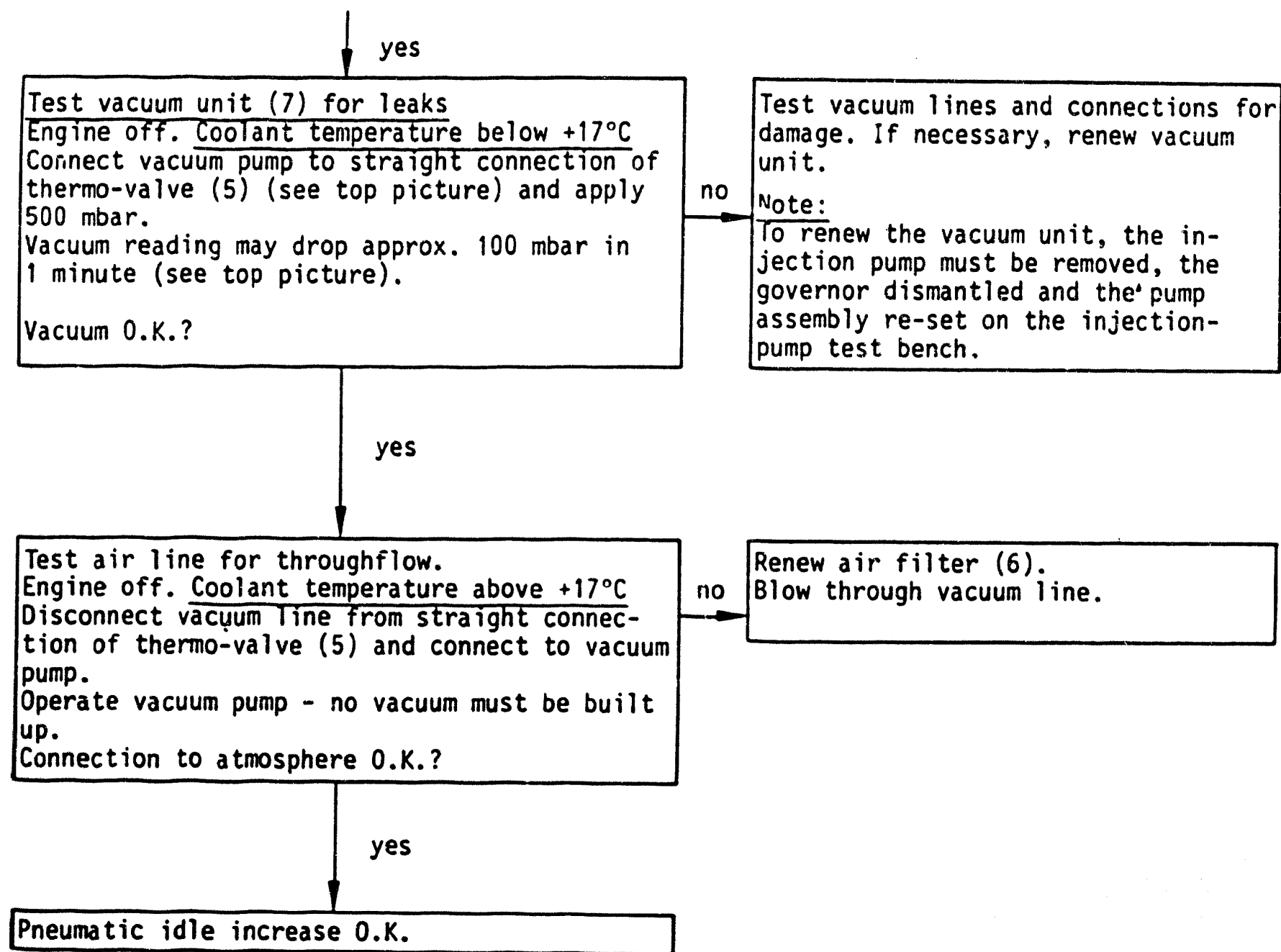
Check pneumatic idle increase
MB 200D, 250D, 300D (W 124)



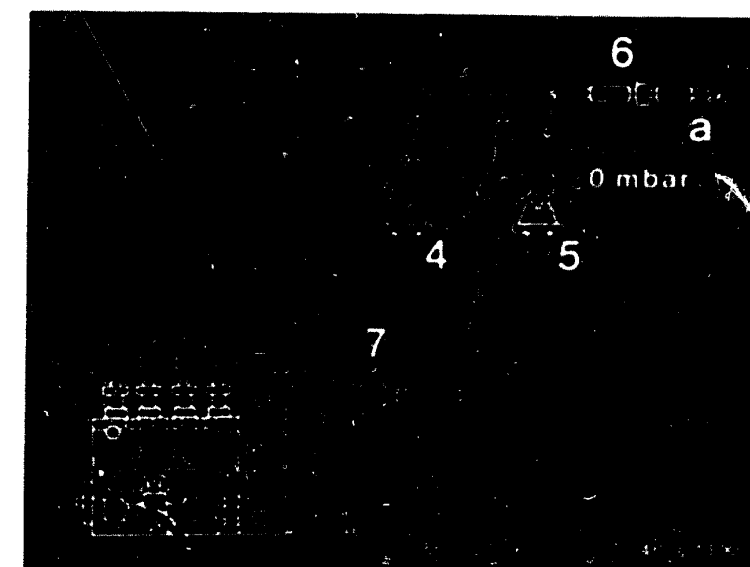
C16

Check pneumatic idle increase
MB 200D, 250D, 300D (W 124)





- a = Air line
- 4 = Thermo-valve
- 5 = Thermo-valve
- 6 = Air filter
- 7 = Vacuum unit



C17

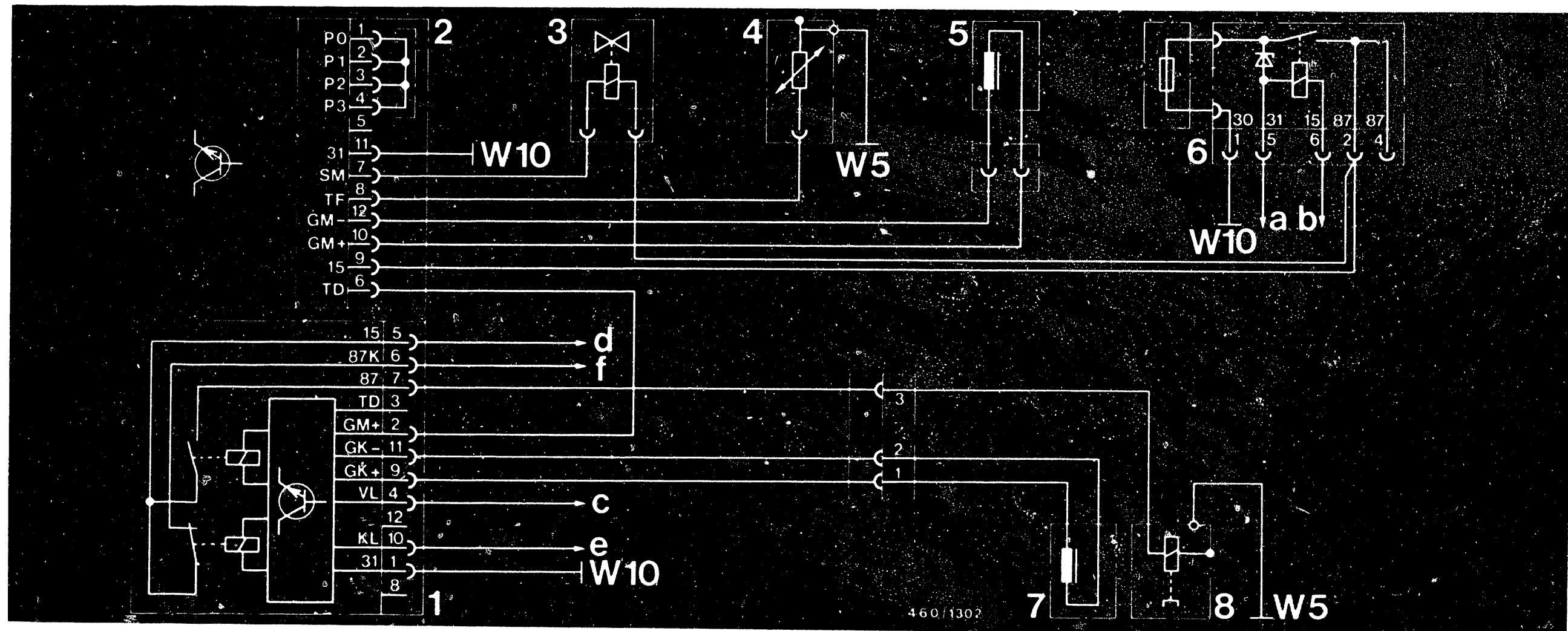
Check pneumatic idle increase
 MB 200D, 250D, 300D (W 124)



C18

Check pneumatic idle increase
 MB 200D, 250D, 300D (W 124)





- 1 = Refrigerant-compressor control unit
- 2 = Idle-speed-control control unit
- 3 = Injection-pump servomagnet
- 4 = Coolant temperature sensor
- 5 = Engine-speed sensor
- 6 = Overvoltage protection
- 7 = Refrigerant-compressor engine-speed sensor
- 8 = Refrigerant-compressor electromagnetic clutch

- a = Plug connector, 12-pin socket 1 (term. 15)
- b = Engine cable connector term. 30
- c = Microswitch socket 3
- d = Auxiliary-fan double-contact relay series resistor socket 4 term. 86
- e = Refrigerant-compressor pressure switch
- f = Engine-compartment plug connector 12-pin socket 9
- W5 = Engine ground
- W10 = Battery ground

17. Check electronic idle-speed control (ELR)

17.1 Circuit diagram of electronic idle-speed control, vehicles with automatic transmission and air conditioner

C19

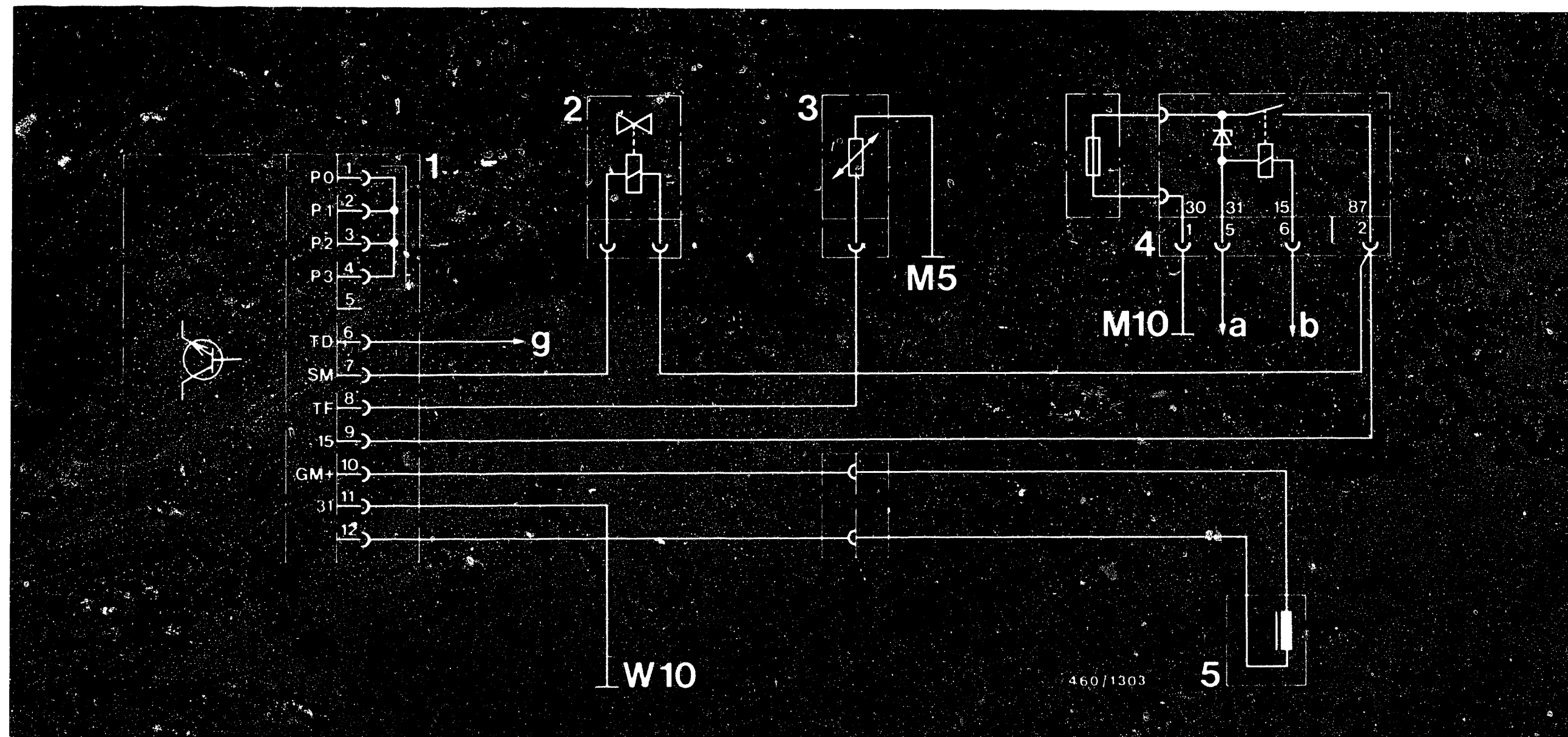
Check electron. idle-speed control
MB 200D, 250D, 300D (W 124)



C20

Check electron. idle-speed control
(MB 200D, 250D, 300D (W 124))





- 1 = Idle-speed-control control unit
- 2 = Injection-pump servomagnet
- 3 = Idle-speed control coolant sensor
- 4 = Overvoltage-protection relay
- 5 = Starting-motor ring-gear engine-speed sensor

- a = Engine plug connector, 12-pin, socket 1, term. 15
- b = Engine cable connector, term. 30
- M5 = Engine ground
- M10 = Spring-strut-crown ground

17.2 Circuit diagram of electronic idle-speed control ELR, vehicles without air conditioner

C21

Check electron. idle-speed control
MB 200D, 240D, 300D (W 124)



C22

Check electron. idle-speed control
MB 200D, 240D, 300D (W 124)



17.3 Functional description of electronic idle-speed control (ELR)

ELR is installed in vehicles with

- engines 601 and 602 with air conditioner and automatic transmission
- engine 603 (all versions)

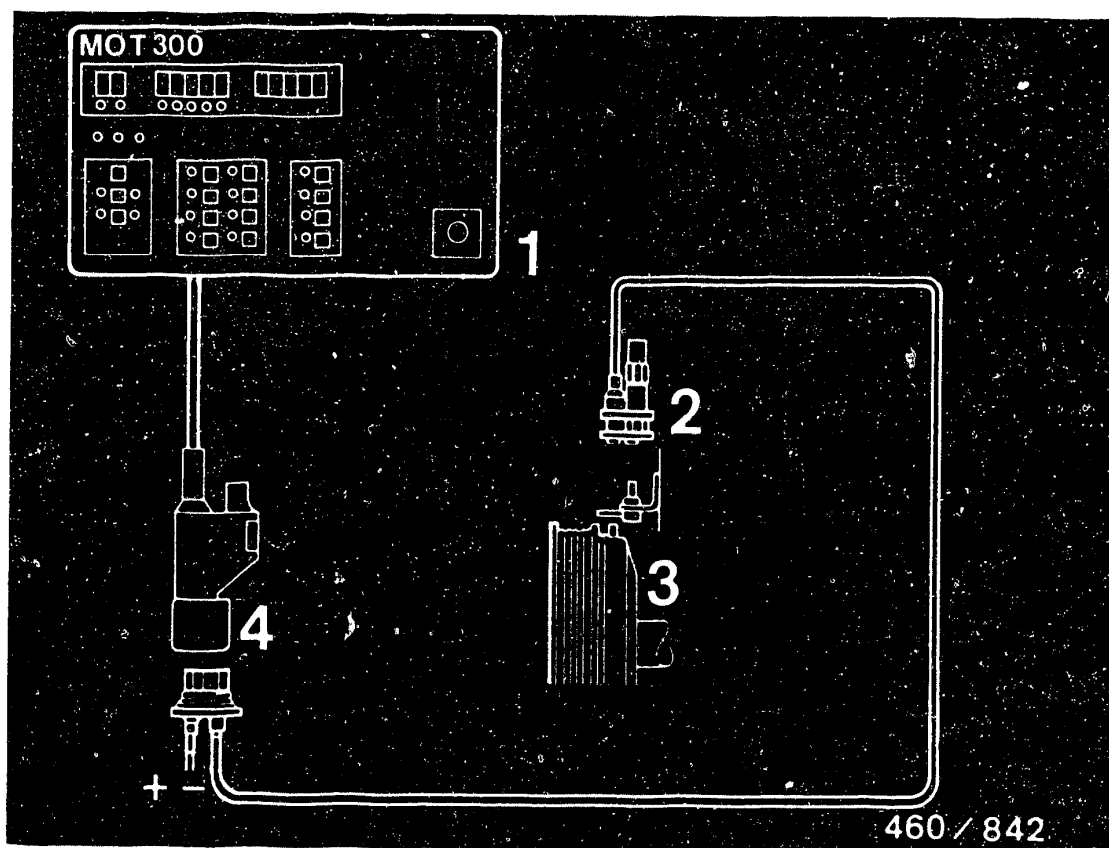
The engine-speed sensor measures the engine speed (144 pulses/revolution) and transmits this information to the control unit in the form of an AC voltage.

The control unit of the idle-speed system accepts the re-shaped engine speed signal, performs a comparison between setpoint and actual values, and transmits appropriate pulses to the servomagnet on the fuel-injection pump.

Consequently, the idle speed is kept constant irrespective of the load on the engine.

Thanks to the temperature sensor, at coolant temperatures less than 60° C, the idle-speed setpoint is raised in accordance with a pre-set characteristic.





1 = Tester
2 = TDC pickup

3 = Pulley
4 = Adapter lead

17.5 Terminal diagram for checking the electronically controlled idle speed with MOT 300 - or diesel tester

Necessary test equipment:

TDC pickup engine 601 DB part no.: 601 589 042 100
TDC pickup engine 602 DB part no.: 603 589 002 100
TDC pickup engine 603 DB part no.: 603 589 002 100

Adapter lead for MOT 300,
Bosch part no.:
Adapter lead for diesel tester
Bosch part no.:

1 684 463 094

1 684 463 147

Note:

If a TDC pickup is not available, measure engine speed using commercially available tachometer (e.g. photo-electric).

17.5.1 Conditions for testing

- Battery voltage at least 11.5 V
- Selector lever for automatic transmission in position "P"
- Air conditioner off
- Cable must be up against reverse-transfer lever free of tension
- Engine coolant temperature $> 60^{\circ} \text{C}$

D1

Check electron. idle-speed control

MB 200D, 250D, 300D (W 124)



17.5.2 Test procedure

Engine running at idle.
Electronically controlled
idle speed should be:

Engine 601:
700 ... 740 min⁻¹
Engine 602:
660 ... 700 min⁻¹
Engine 603:
610 ... 650 min⁻¹

Idle speed O.K.?

No

Test step 1

1. Disconnect plug from servomagnet on injection pump. Briefly (max. 3 sec., otherwise servomagnet defective) apply 12 V (see top picture). If idle speed does not increase, servomagnet defective - replace (pay attention to adjusting shims when removing/installing).

2. Check uncontrolled idle speed (plug disconnected from servomagnet):

Engine 601: 620 ... 700 min⁻¹
Engine 602: 580 ... 660 min⁻¹
Engine 603: 530 ... 610 min⁻¹

If necessary, adjust idle speed at adjusting screw on injection pump after loosening the lock nut (see arrow, center picture).

Test step 2

1. Engine off. Using voltmeter, check whether approx. battery voltage is present at both contacts of fuse on overvoltage protection unit. Replace defective fuse.

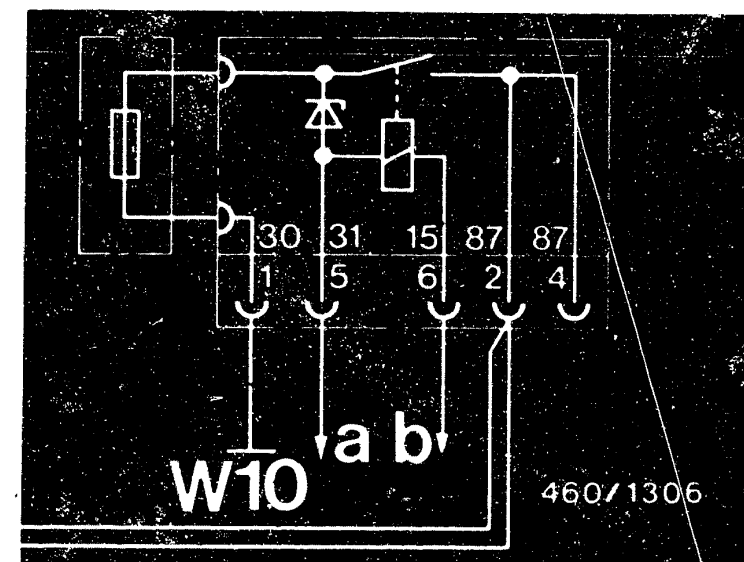
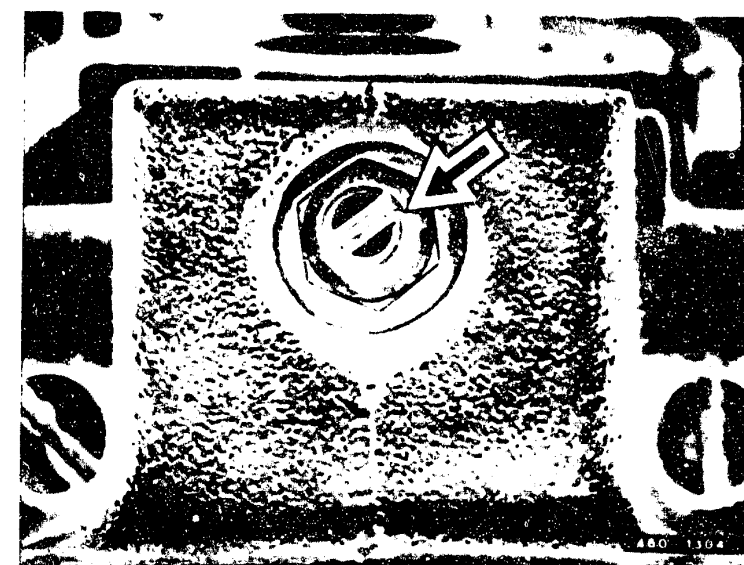
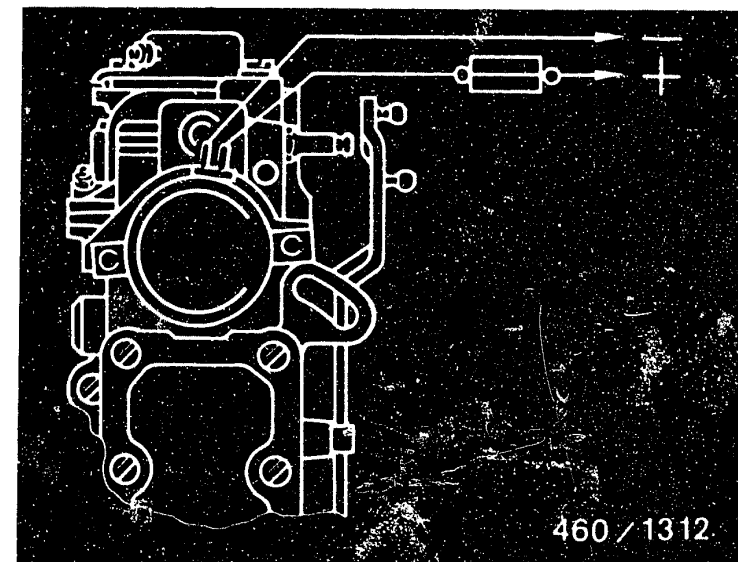
2. Check for open circuit in lead from engine cable connector term. 30, in lead from engine plug connector socket 1 (12-pin) term. 15 and in lead from battery ground to overvoltage protection unit term. 1, 6 and 5 (see bottom diagram). Eliminate open circuit. If no fault in point 1 and no open circuit in point 2, replace overvoltage protection unit.

3. Check for open circuit in lead from overvoltage protection unit term. 2 to servomagnet. Eliminate open circuit.

yes

Continued on D6/D7

Continued on D4/D5



D2

Check electron. idle-speed control
MB 200D, 250D, 300D, (W 124)



D3

Check electron. idle-speed control
MB 200D, 250D, 300D, (W 124)



Continued

4. Disconnect ELR control unit (1). Check for open in leads from ELR control-unit base socket term. 11 to battery ground, from term. 7 to servomagnet, from term. 8 to coolant temperature sensor, from term. 10 and 12 to engine-speed sensor, from term. 9 to overvoltage protection unit term. 2. Eliminate open circuit.

Test step 3

Connect ELR control unit (1). Engine idling. Disconnect plug from servomagnet and check voltage at plug.

Reading should be approx. battery voltage. If voltage not obtained, replace ELR control unit.

Test step 4

1. Engine off. Disconnect ELR control unit. Measure resistance of engine-speed sensor at base socket between sockets 10 and 12.

Reading should be $1.9 \pm 0.2 \text{ k}\Omega$

If reading not within tolerance, replace engine-speed sensor (seated on flange to transmission).

2. Run engine at idle.

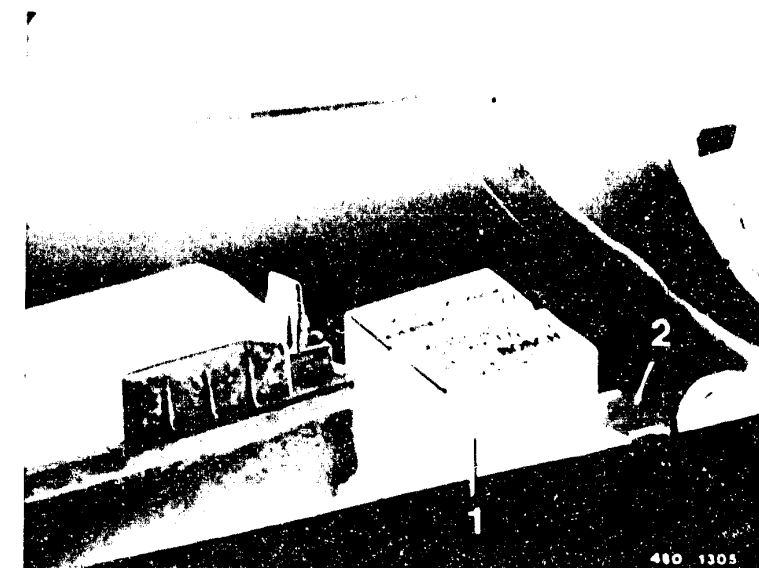
Measure AC voltage at socket base between sockets 10 and 12. Reading should be $> 4 \text{ V}$.

With rising engine speed = rising voltage (\sim). If voltage not obtained, replace engine/speed sensor.

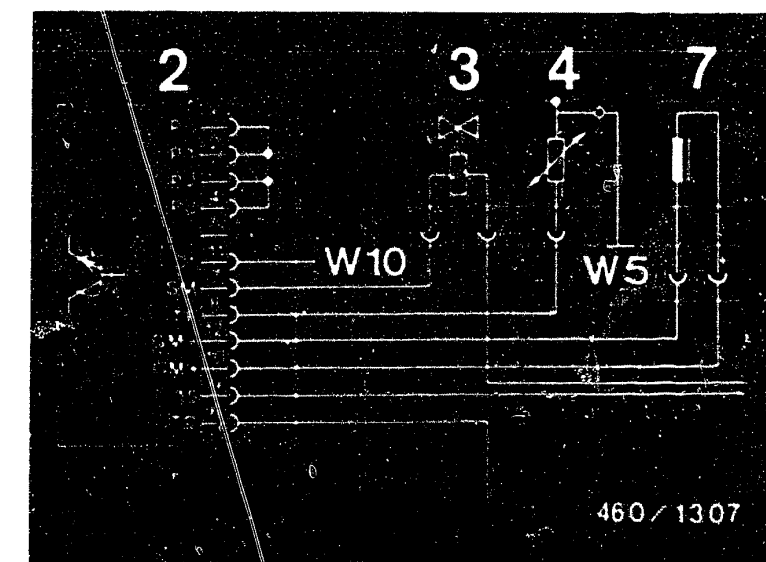
Yes

Continued on D6/D7

Continued on D6/D7



1 = ELR control unit
2 = Overvoltage protection unit



D4

Check electron. idle-speed control
MB 200D, 250D, 300D (W 124)



D5

Check electron. idle-speed control
MB 200D, 250D, 300D (W 124)



Continued

3. Run engine at idle. Disconnect plug from coolant temperature sensor. Simulate coolant temperature $+20^{\circ}\text{C}$ with test resistor (fixed resistance $2.5\text{ k}\Omega$) between plug and ground. Engine speed must increase. Otherwise temperature sensor defective - replace.

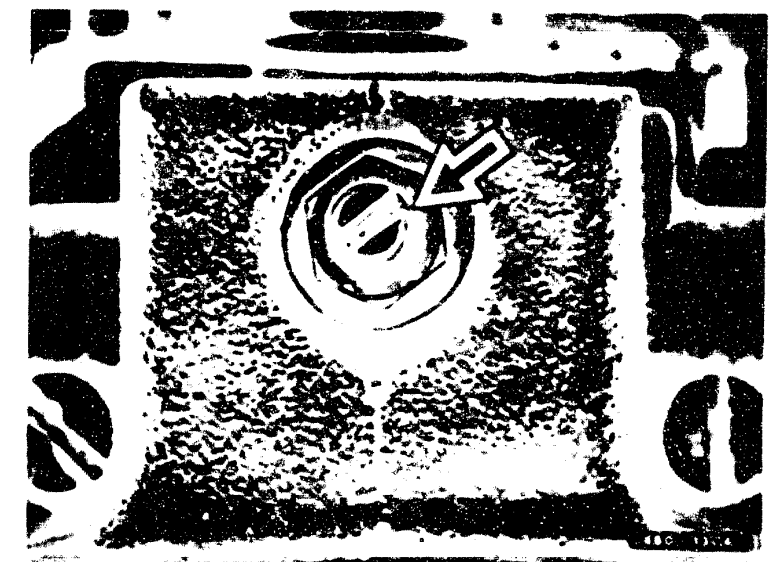
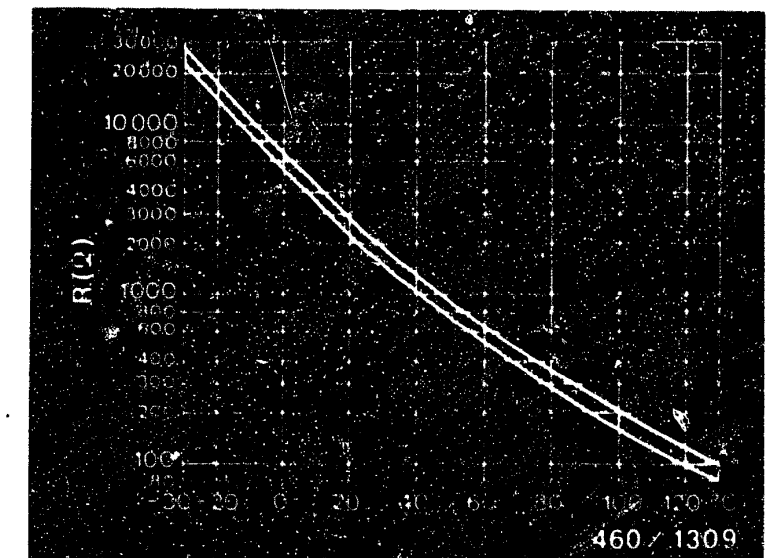
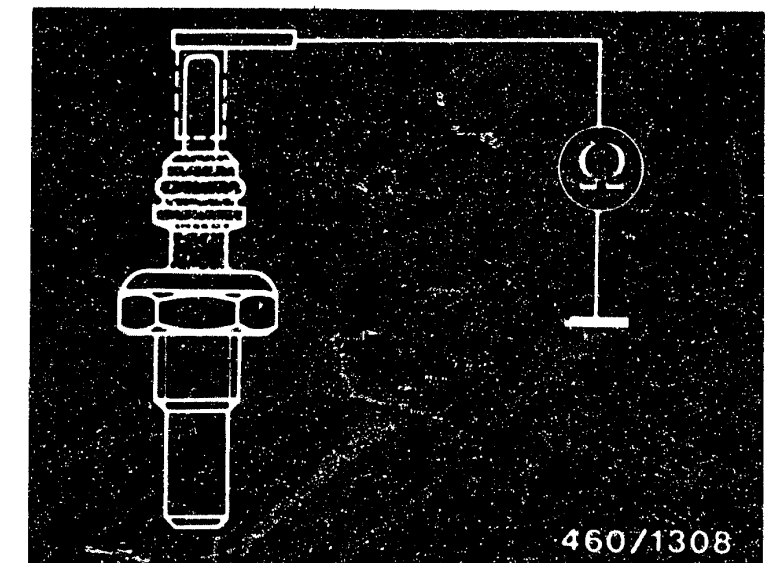
4. Engine off. Using ohmmeter, check internal resistance of temperature sensor to ground (see top picture). See graph for set value.

Example:

$+20^{\circ}\text{C}$ $2.2 \dots 2.8\text{ k}\Omega$

$+80^{\circ}\text{C}$ $290 \dots 370\ \Omega$

If set values not obtained, replace temperature sensor.



Yes

Check uncontrolled idle-speed. Disconnect plug from servomagnet. Uncontrolled idle-speed should be:
 Engine 601:
 $620 \dots 700\text{ min}^{-1}$
 Engine 602:
 $580 \dots 660\text{ min}^{-1}$
 Engine 603:
 $530 \dots 610\text{ min}^{-1}$
 Idle speed O.K.?

No

Adjust idle speed at adjusting screw on injection pump (see arrow, bottom picture) after loosening the lock nut.

Yes

Testing completed.
 Electronic idle-speed control O.K.

D6

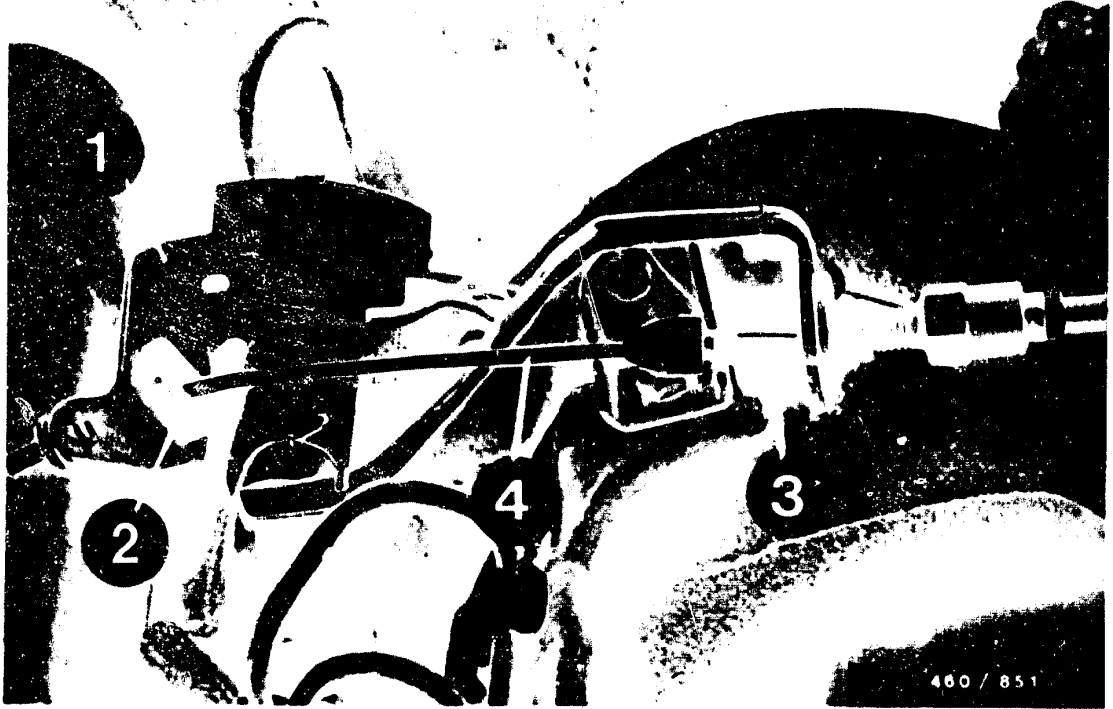
Check electron. idle-speed control
 MB 200D, 250D, 300D (W 124)



D7

Check electron. idle-speed control
 MB 200D, 250D, 300D (W 124)





- 1 = Bell crank
- 2 = Guide piece
- 3 = Expansion clamp
- 4 = Cable

18. Adjust engine-speed regulation mechanism

Check regulating linkage for damage (deformation) and wear; check cable for freedom of movement. Renew defective parts.

Note:

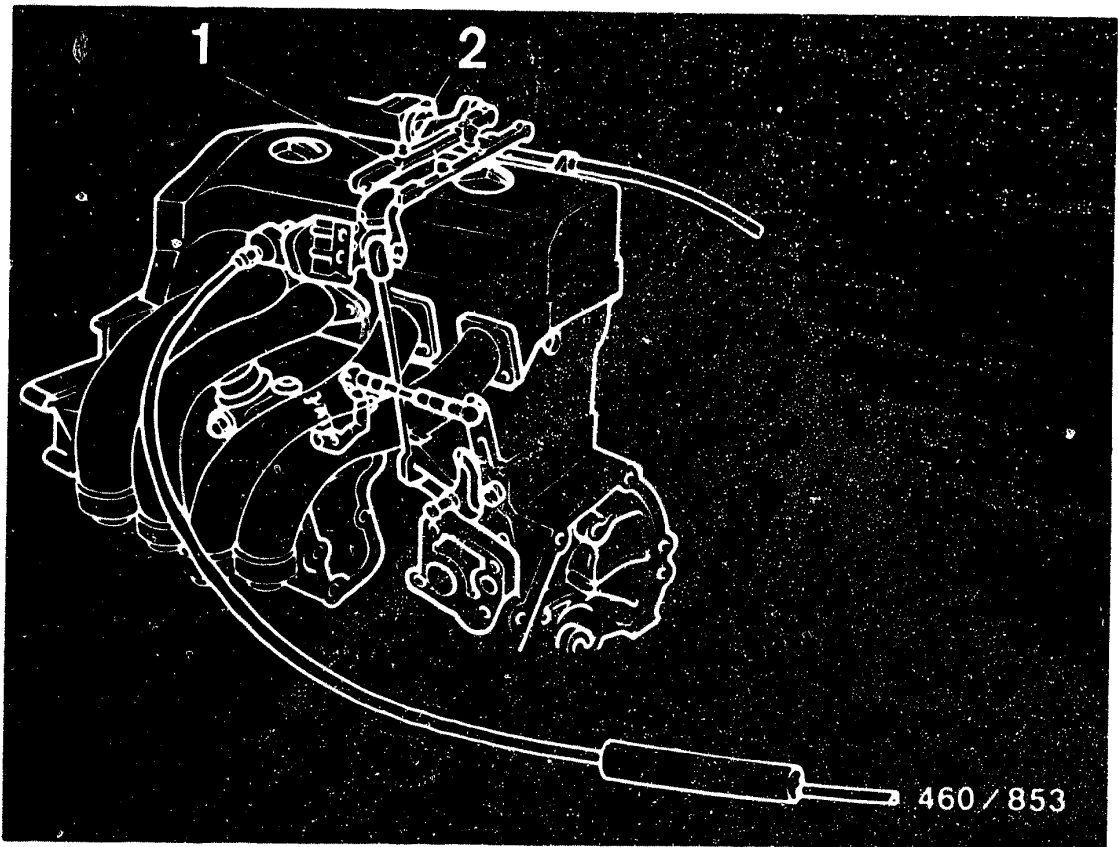
Press out slotted guide piece on bell crank. Press together expansion clamp, as a result of which cable can be unhooked and removed.

D8:

Adjust eng.-speed reg. mechanism

MB 200D, 250D, 300D (W 124)





- 1 = Connecting rod
2 = Cruise control

18.1 Test and adjust idle stop on vehicles with manual transmission

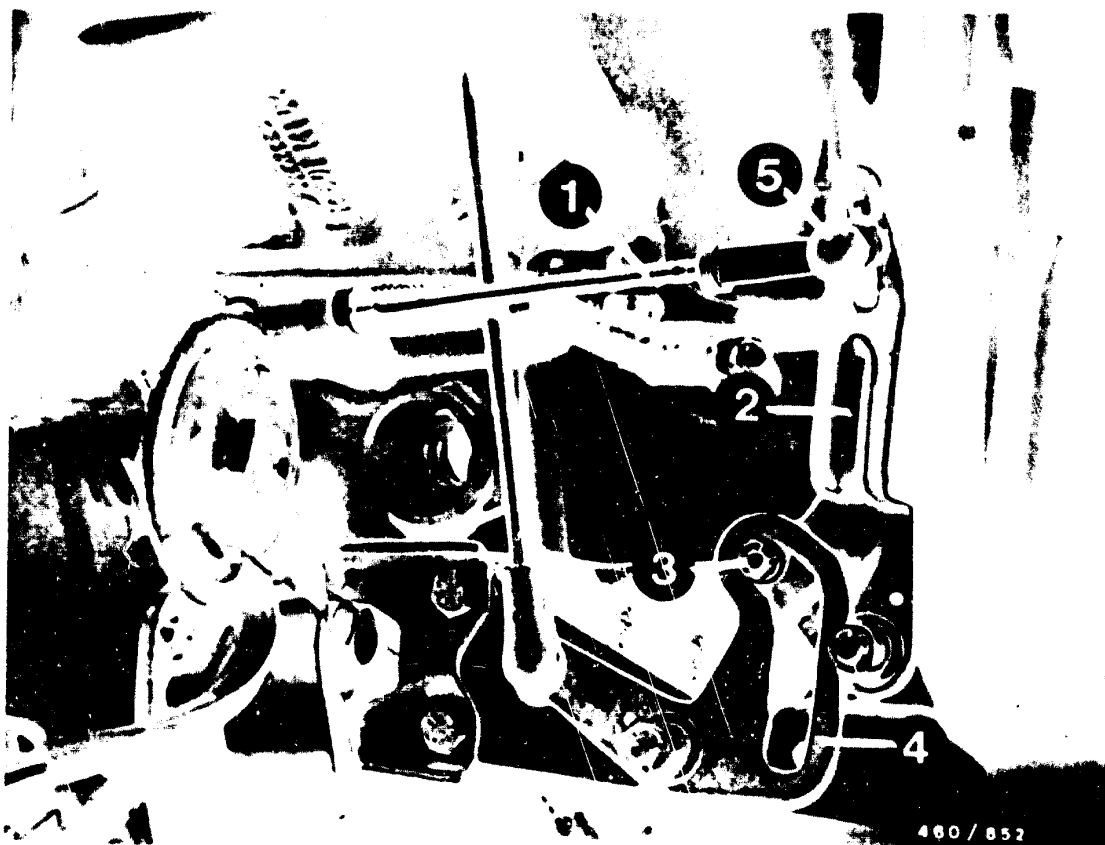
Check whether control lever of injection pump is up against idle stop. To do this, unhook connecting rod on cruise control.

D9

Adjust eng.-speed reg. mechanism

MB 200D, 250D, 300D (W 124)





1 = Connecting rod
2 = Deflection lever
3 = Roller

4 = Variable-fulcrum lever
5 = Ball head (adjustable)

18.2 Test and adjust idle stop on vehicles with auto- matic transmission

Unhook adjustable connecting rod on deflection lever. Check whether control lever of injection pump is up against idle stop.

Hook in connecting rod free of tension. Make sure that roller in variable-fulcrum lever is up against end stop free of tension (see picture). If necessary, adjust connecting rod.

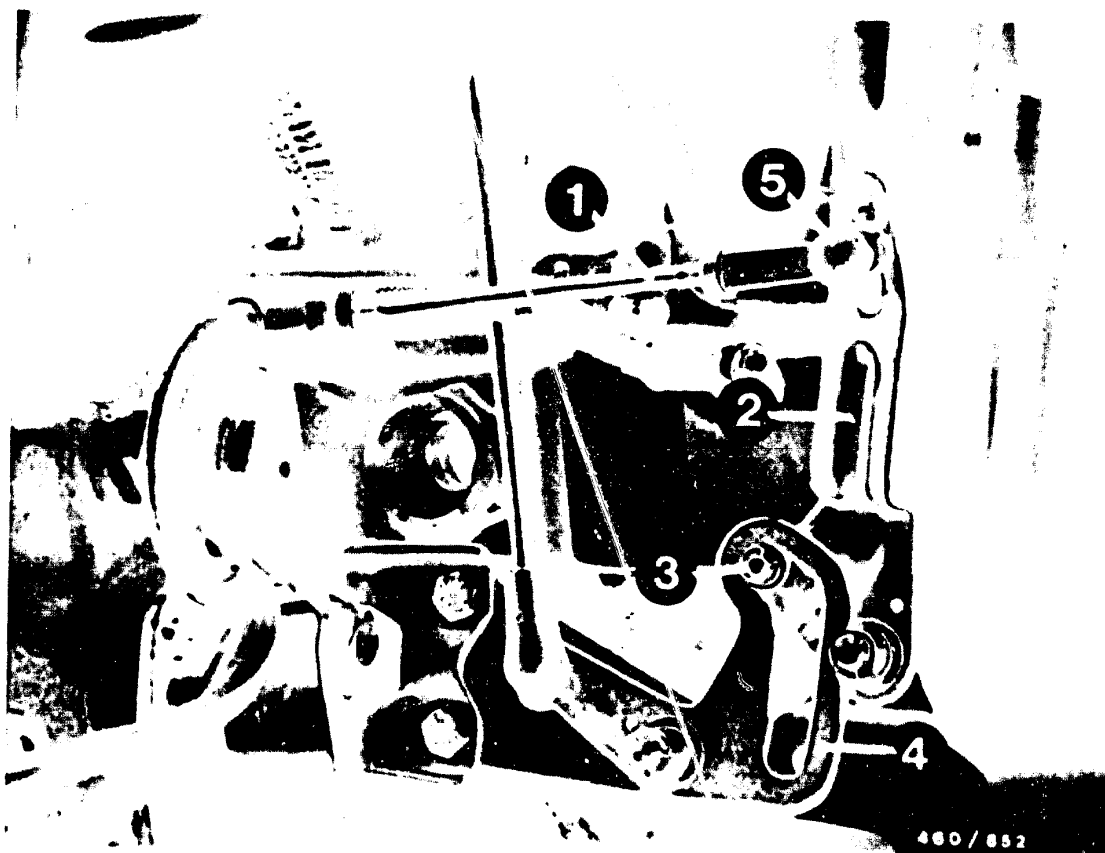
Setting dimension of connecting rod from centre of ball head to centre of ball head = 146 ± 8 mm.

D10

Adjust eng.-speed reg. mechanism

MB 200D, 250D, 300D (W 124)





1 = Connecting rod
2 = Deflection lever
3 = Roller

4 = Variable fulcrum lever
5 = Ball head (adjustable)

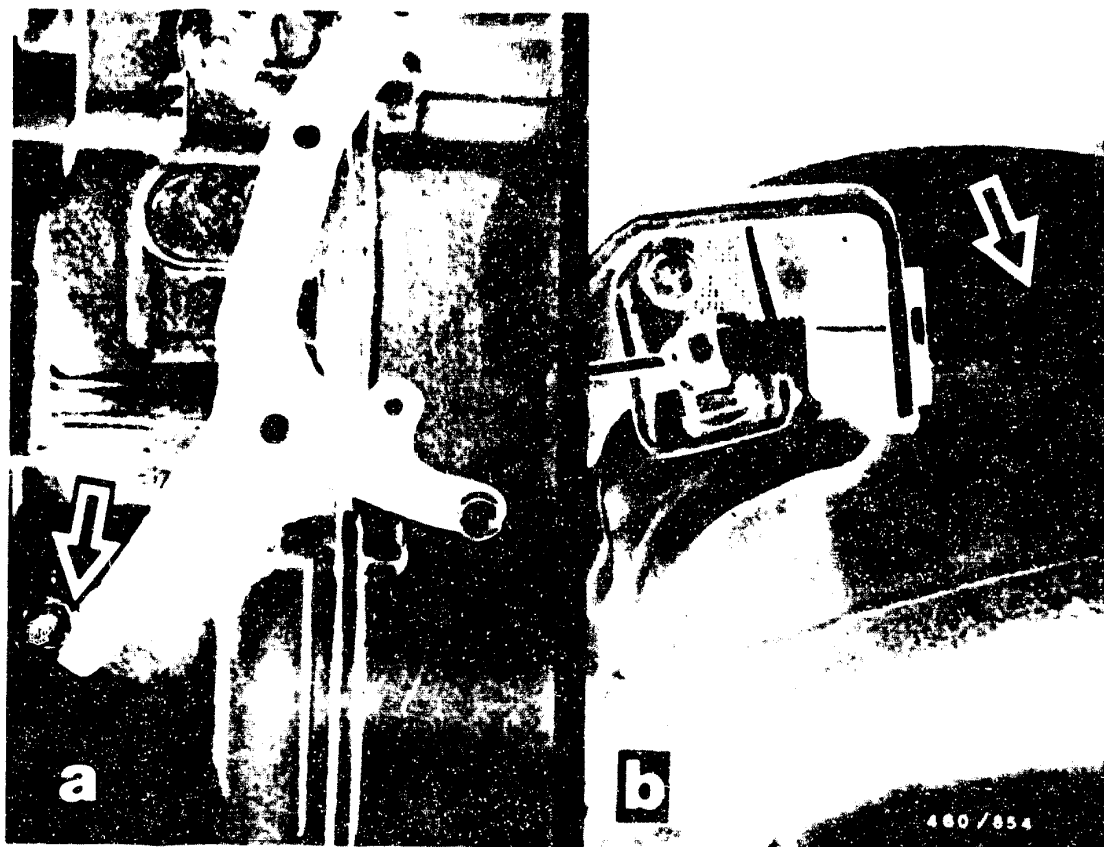
Pull variable-fulcrum lever to full load. Injection-pump control lever must be up against full-load stop. If control lever is not up against full-load stop, loosen adjustable ball head, slide in deflection lever slot and lock again.

D11

Adjust eng.-speed reg. mechanism

MB 200D, 250D, 300D (W 124)





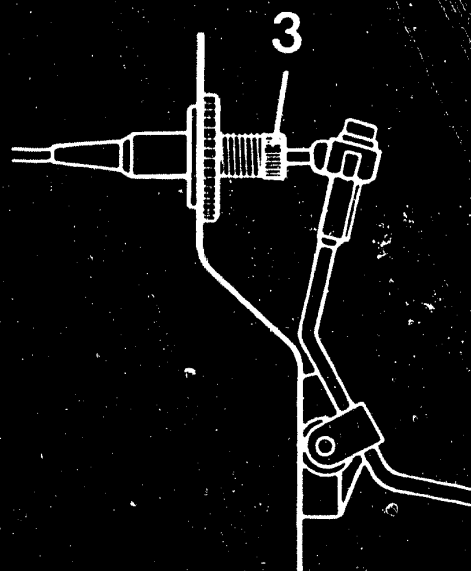
18.3 Test and adjust full-load stop on vehicles with manual and automatic transmission

With engine stopped, press accelerator in passenger compartment as far as full-load stop or, in case of automatic transmission, as far as stop on kickdown switch.

Injection-pump control lever must be up against full-load stop (arrow, picture a).

Check by pressing the connecting rod. If necessary, adjust by means of adjusting screw (arrow, picture b) on cable.





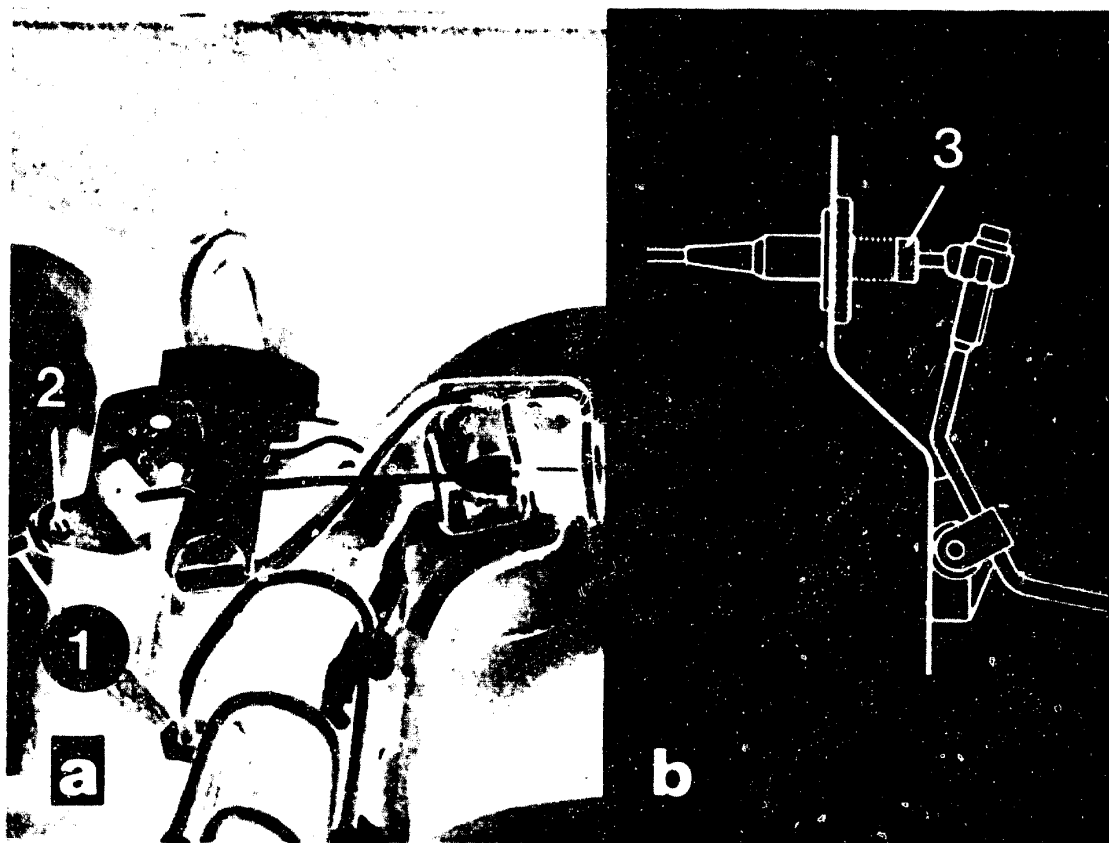
- 1 = Roller
- 2 = Variable-fulcrum lever
- 3 = Adjusting nut

Slowly ease off accelerator from full-load position into idle position. In this position, the roller in the variable-fulcrum lever must be up against end stop free of tension (see picture a). If necessary, correct adjustment in passenger compartment by means of adjusting nut (picture b).

D13

Adjust eng.-speed reg. mechanism
MB 200D, 250D, 300D (W 124)





- 1 = Cable nipple
- 2 = Compression spring
- 3 = Adjusting nut

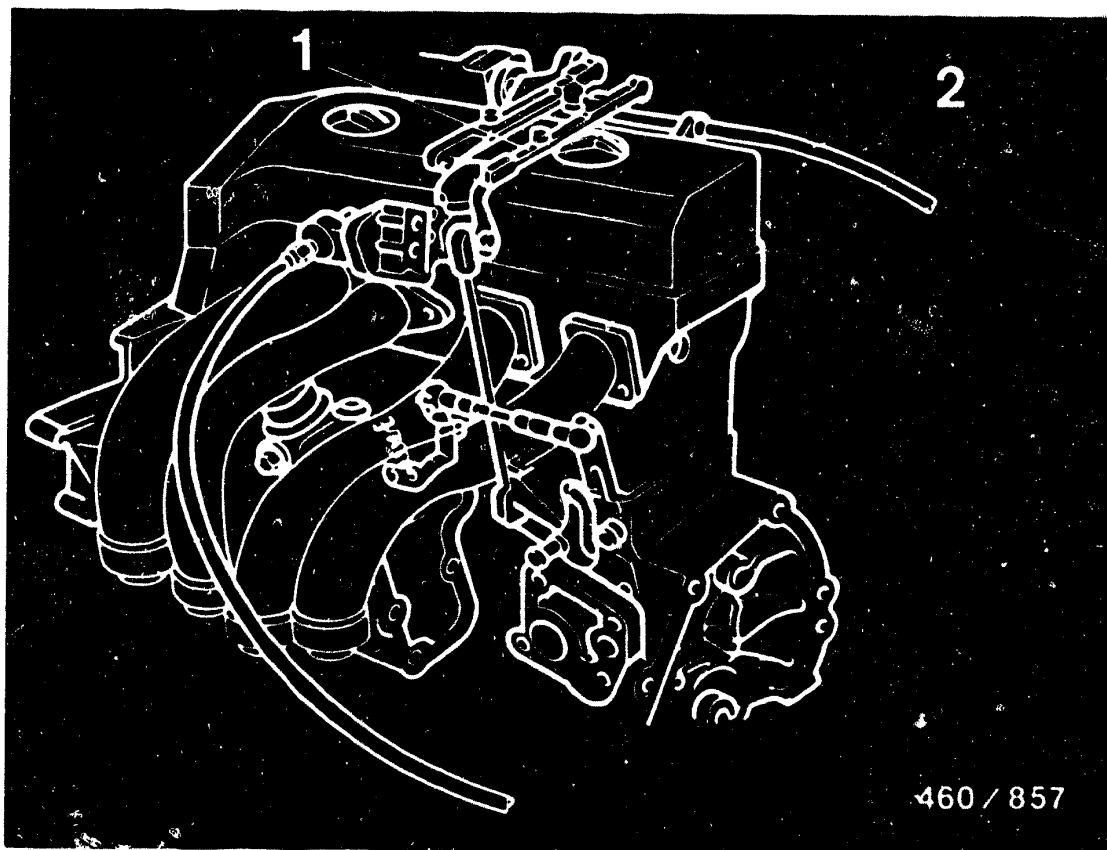
In the idle position, the nipple of the cable must be up against the compression spring free of tension (picture a).

If necessary, appropriately adjust cable from passenger compartment by means of adjusting nuts.

D14

Adjust eng.-speed req. mechanism
MB 200D, 250D, 300D (W 124)





- 1 = Idle travel rod
2 = Control pressure cable

18.4 Adjust control pressure cable

Unhook control pressure cable ball socket. Extend idle travel rod as far as it will go. Pull control pressure cable forward until slight resistance can be felt.

In this position, hold ball socket over ball head and hook in free of tension.

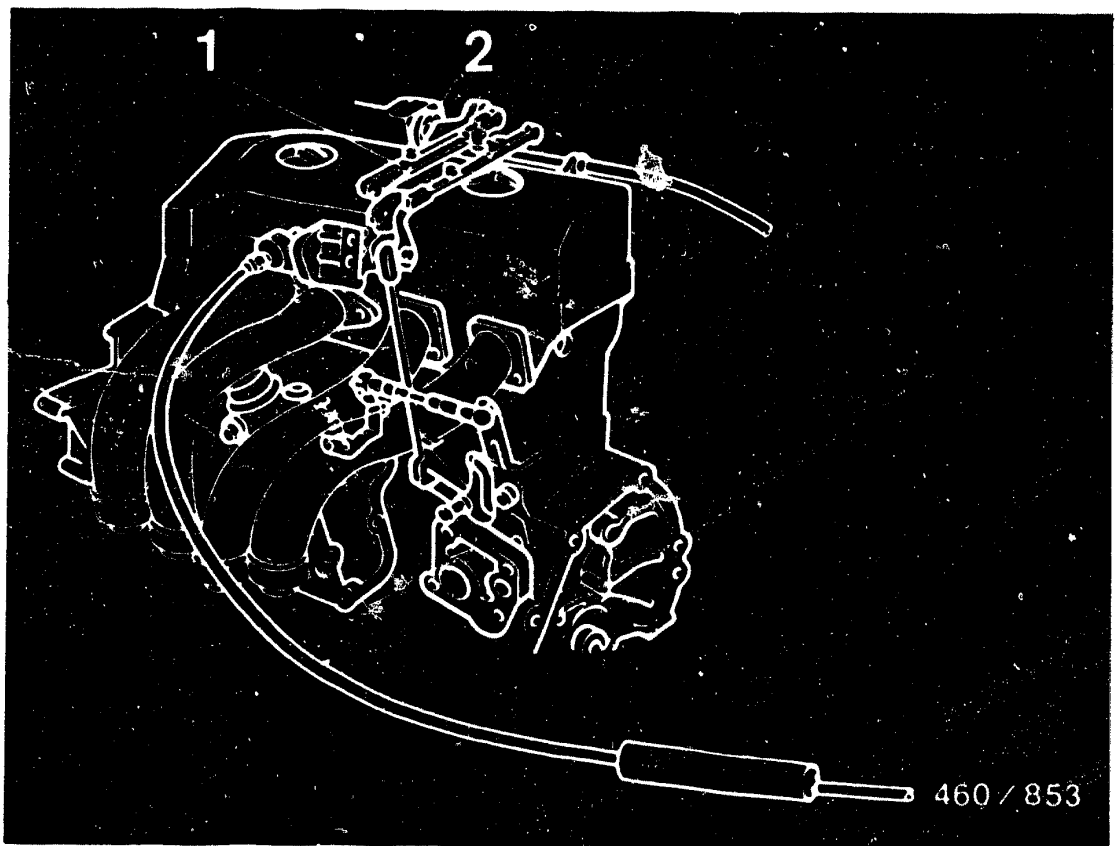
If necessary, move idle travel rod to do this.

D15

Adjust eng.-speed reg. mechanism

MB 200D, 250D, 300D (W 124)





- 1 = Connecting rod
- 2 = Cruise control
- 3 = Deflection lever

18.5 Adjust cruise control

Unhook connecting rod on actuator and press deflection lever into idle position.

Adjust length of connecting rod so that it is 1 mm shorter than the actual maximum gap. Hook in connecting rod and lock.



19. Test vacuum control valve

Test conditions

Engine at normal operating temperature. Regulating linkage adjusted. Disconnect black/white vacuum line (see picture, arrow) and connect vacuum tester. Test vacuum at idle speed. Set value: 390 - 440 mbar.

With engine stopped and regulating linkage at full-load stop
set value: 0 mbar

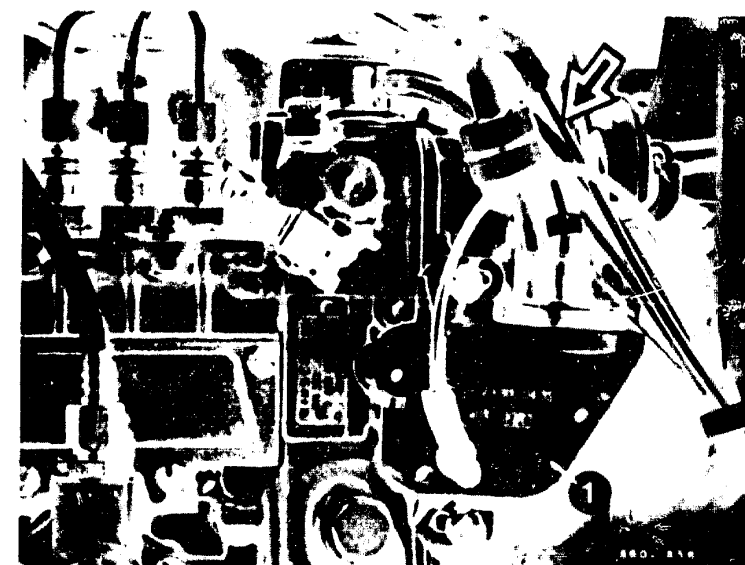
Test specifications O.K.?

yes

Vacuum control valve O.K.

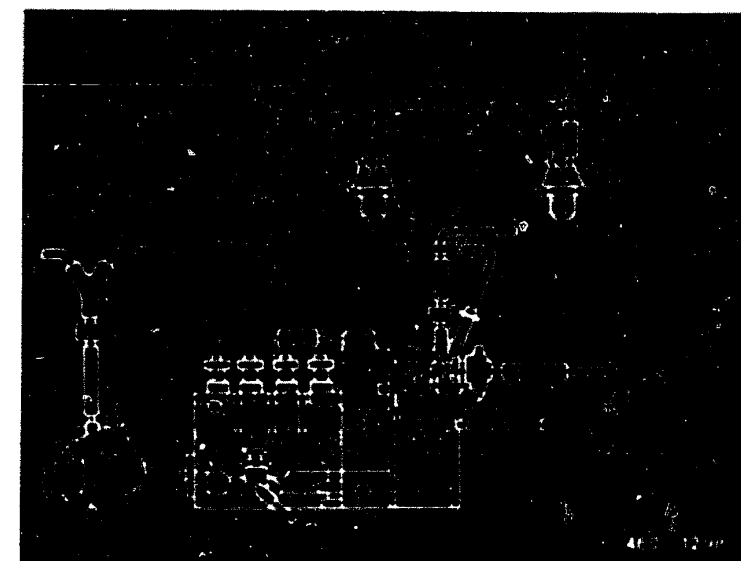
Test vacuum lines for leaks in accordance with functional diagram.

no Adjust vacuum control valve. To do this, press injection pump regulating lever to full load. Turn vacuum control valve all the way to the right as far as it will go (slot). In this position, tighten fastening screws.



1 = Vacuum control valve

Functional diagram of vacuum



D17

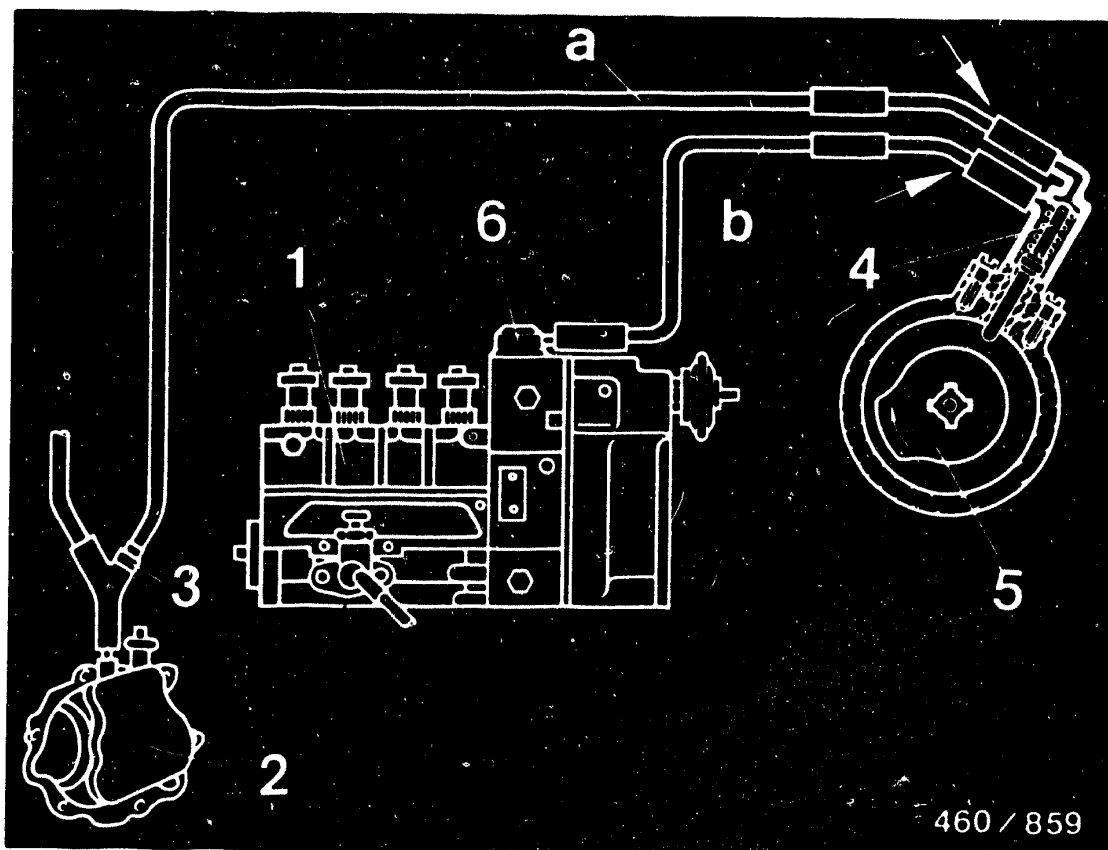
Test vacuum control valve
MB 200D, 250D, 300D (W 124)



D18

Test vacuum control valve
MB 200D, 250D, 300D (W 124)





460 / 859

- a = Suction line (brown)
- b = Control line (brown/blue)
- 1 = Injection pump
- 2 = Vacuum pump
- 3 = Restriction
- 4 = Valve for key-operated starting system
- 5 = Glow-plug and starter switch disc cam
- 6 = Vacuum unit (shutoff box)

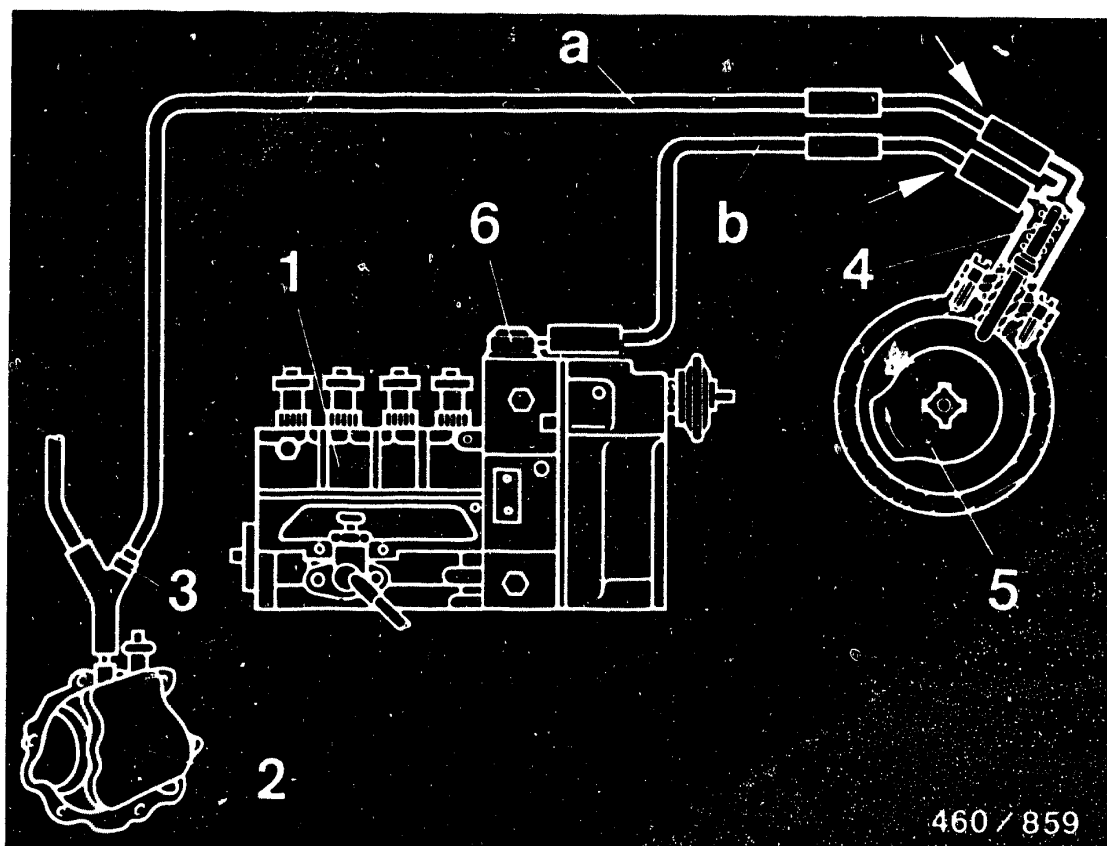
20. Test vacuum shutoff for leaks

D19

Test vacuum shutoff for leaks

MB 200D, 250D, 300D (W 124)

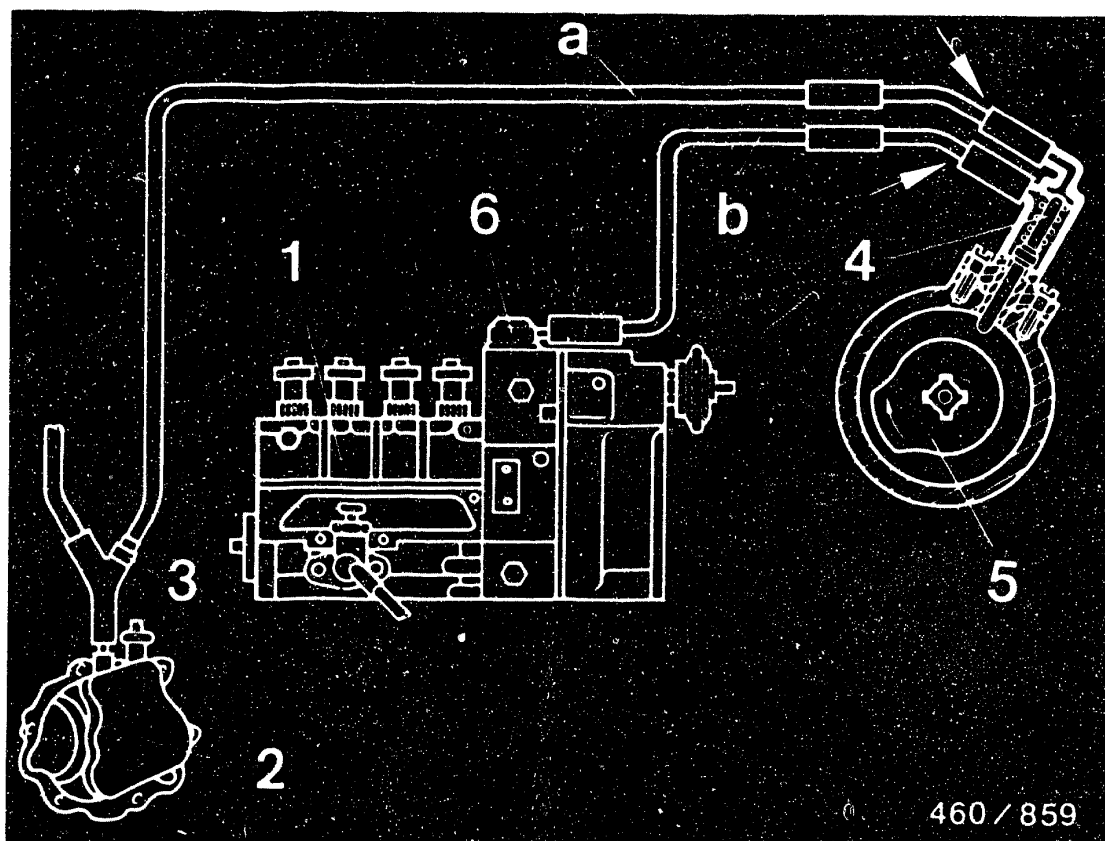




Set glow-plug and starter switch to position "2". Pull suction line (a, brown) out of connecting piece (arrow). Connect vacuum pump to connecting piece and apply 500 mbar vacuum. There must be no loss of vacuum, otherwise valve for key-operated starting system (4) leaking.

Return glow-plug and starter switch to position "0". There must be no loss of vacuum; otherwise valve for key-operated starting system (4) or vacuum unit (shutoff box) (6) leaking. Renew valve and/or vacuum unit. Remove vacuum pump from suction line (a); re-connect suction line (a).

Note: Before renewing the valve and/or vacuum unit, test vacuum lines and their connecting pieces for leaks.

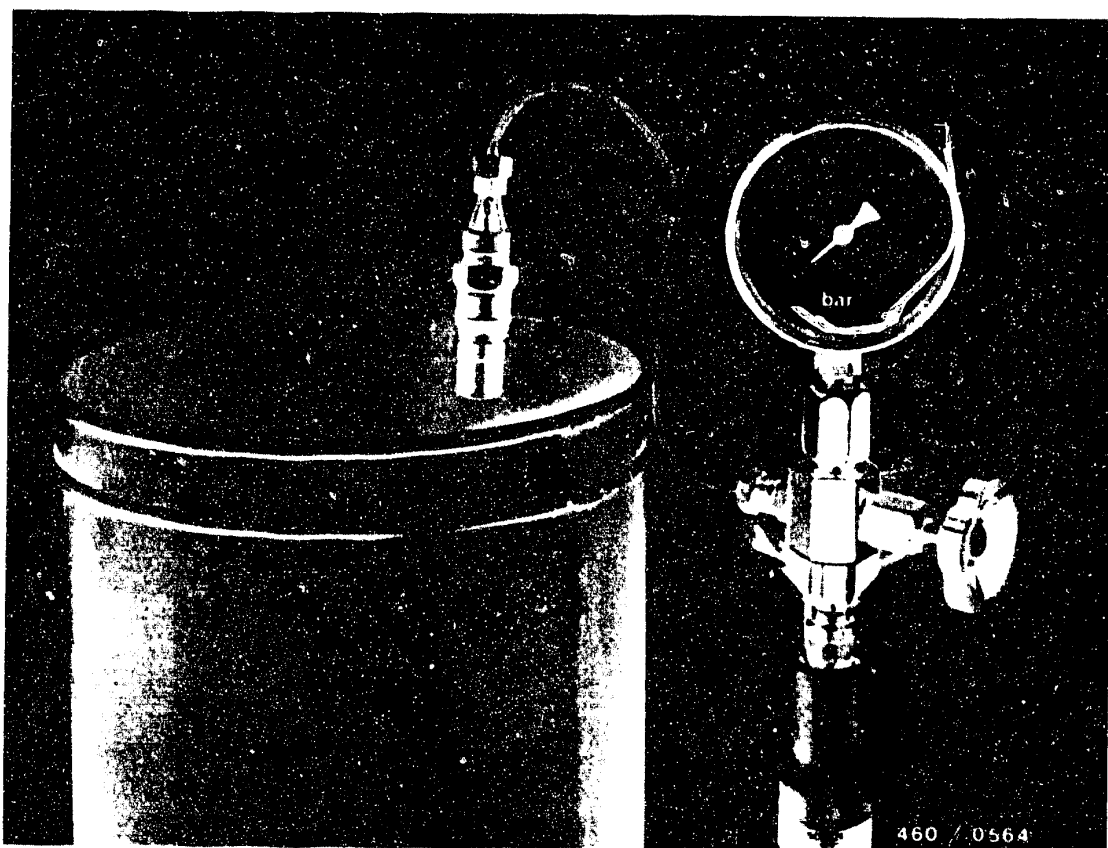


Set glow-plug and starter switch to position "0". Disconnect control line (b, brown/blue) from connecting piece (arrow). Connect vacuum pump to control line and apply 500 mbar vacuum. There must be no loss of vacuum; otherwise vacuum unit (6) or control line leaking.

D21

Test vacuum shutoff for leaks
MB 200D, 250D, 300D (W 124)





21. Test injection nozzles

Remove injection nozzles.

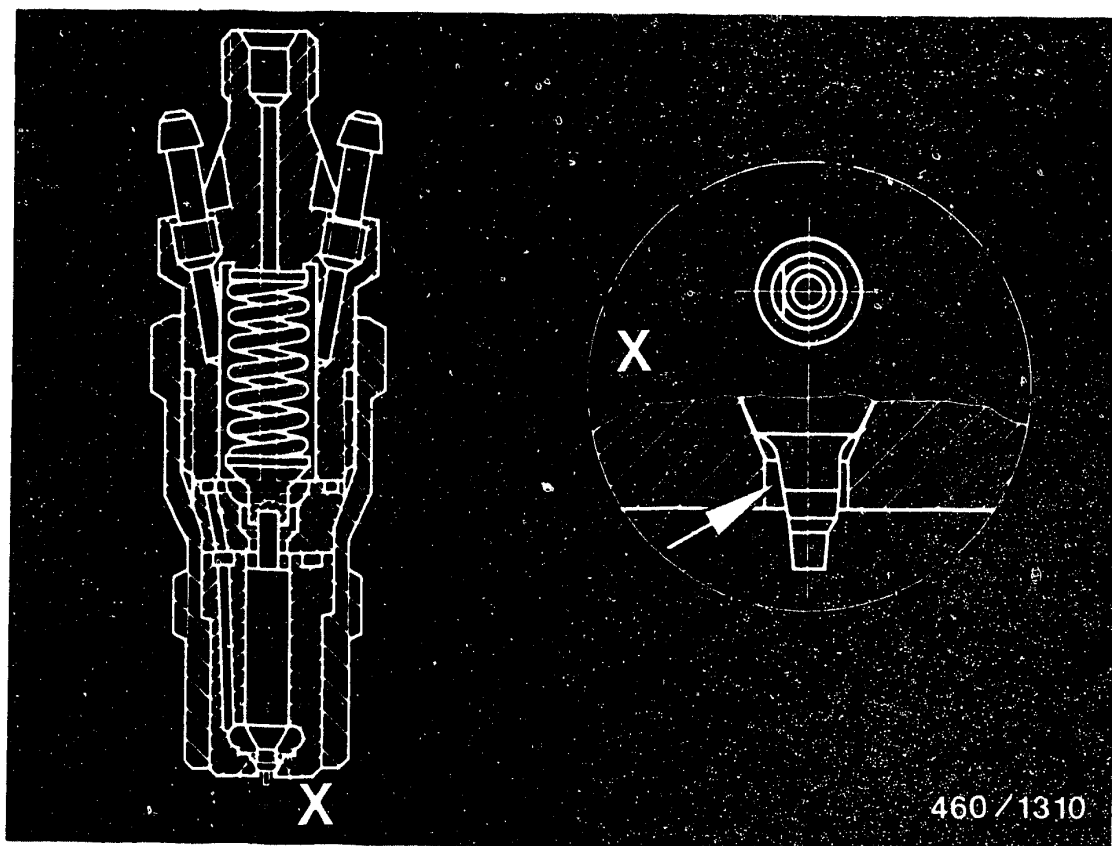
The test is performed using the nozzle tester EFEP 60 H, 0 681 200 502.

Mount injection nozzle with nozzle-holder assembly on nozzle tester.

Caution:

When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.





460 / 1310

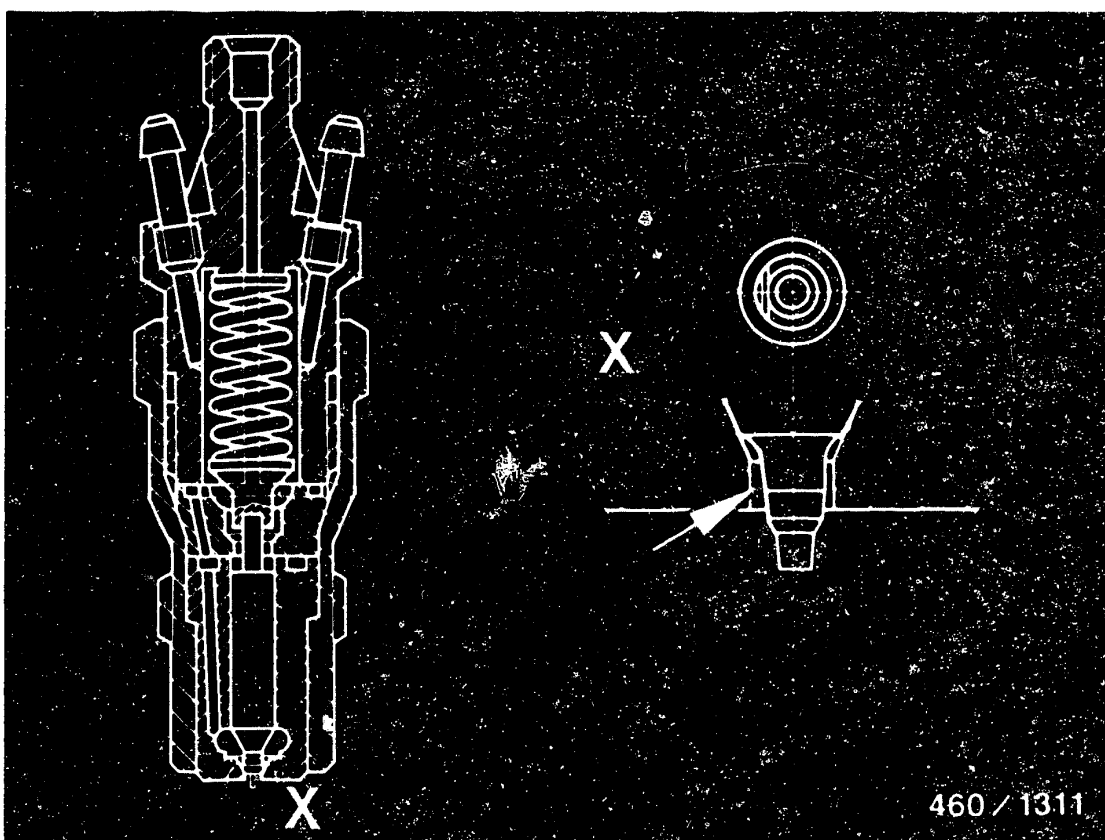
Flat-type pintle nozzles are installed in engine 601 (4-cylinder).

They differ from hole-type pintle nozzles due to a flat on the throttling pintle (see picture, arrow).

D23

Test injection nozzles
MB 200D, 250D, 300D (W 124)





460 / 1311

Modified flat-typed pintle nozzles are installed in engines 602 (5-cylinder) and 603 (6-cylinder) (modified depth of flat on pintle).

D24

Test injection nozzles
MB 200D, 250D, 300D (W 124)



21.1 Chatter test (flat pintle nozzle)

The pressure gauge is switched off.

First of all, slowly move hand lever; the nozzle must chatter; likewise, when the lever is moved quickly and jerkily (4...6 downward movements/sec).

As the lever speed is raised there is a range in which the nozzle does not chatter.

In this chatterless range the calibrating oil may escape in the form of a cord.

Note:

The chattering indicates that the nozzle needle is not restricted in its movement and that the nozzle seat as well as its guide are mechanically correct.

The shape of the spray is not important for the chatter test.

21.2 Check injection pressure

Switch on pressure gauge.

Slowly force lever downward. When nozzle begins to squirt, read off injection pressure.

In the case of deviations from the nominal value, the nozzle-opening pressure must be adjusted by shims behind the pressure spring in the nozzle-holder assembly.

Nominal value: new nozzles 115-123 bar

Nominal value for used nozzles: min. 100 bar

Thicker shims = higher nozzle-opening pressure

Thinner shims = lower nozzle-opening pressure

+/- 0.05 mm of shim causes approx. 5.0 bar pressure difference.



Note:

When assembling the injection nozzle, pay attention to the tightening torque of 70 to 90 Nm.

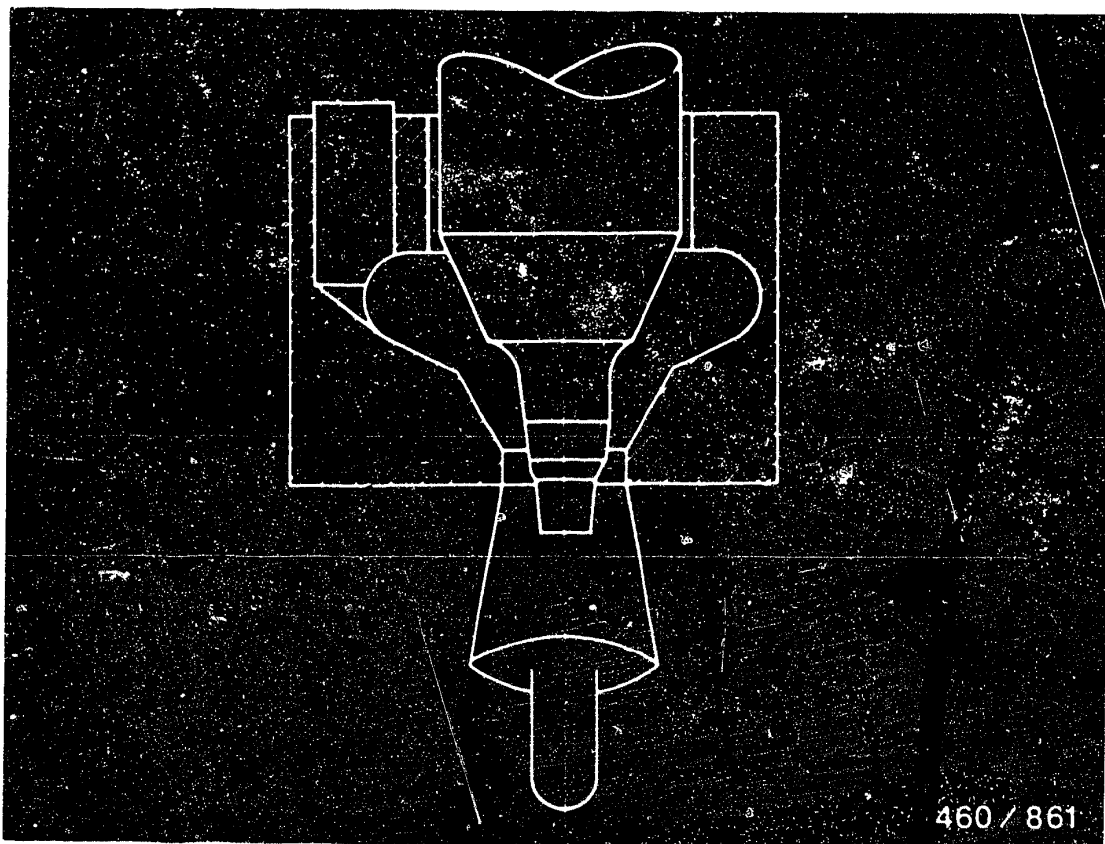
If the tightening torque is exceeded, the nozzle needle may stick.

21.3 Leak test

Switch on pressure gauge.

Slowly force lever downward and maintain pressure approx. 20 bar below opening pressure for 10 seconds. The nozzle must not drip during this period.





21.4 Spray test

Switch off pressure gauge.

Until the high whistling tone is reached, the spray may be in strands and may be unatomized. A split, discontinuous spray is not important in this range. The spray pattern cannot be assessed until when the lever is being operated quickly (4...6 downward movements per second).

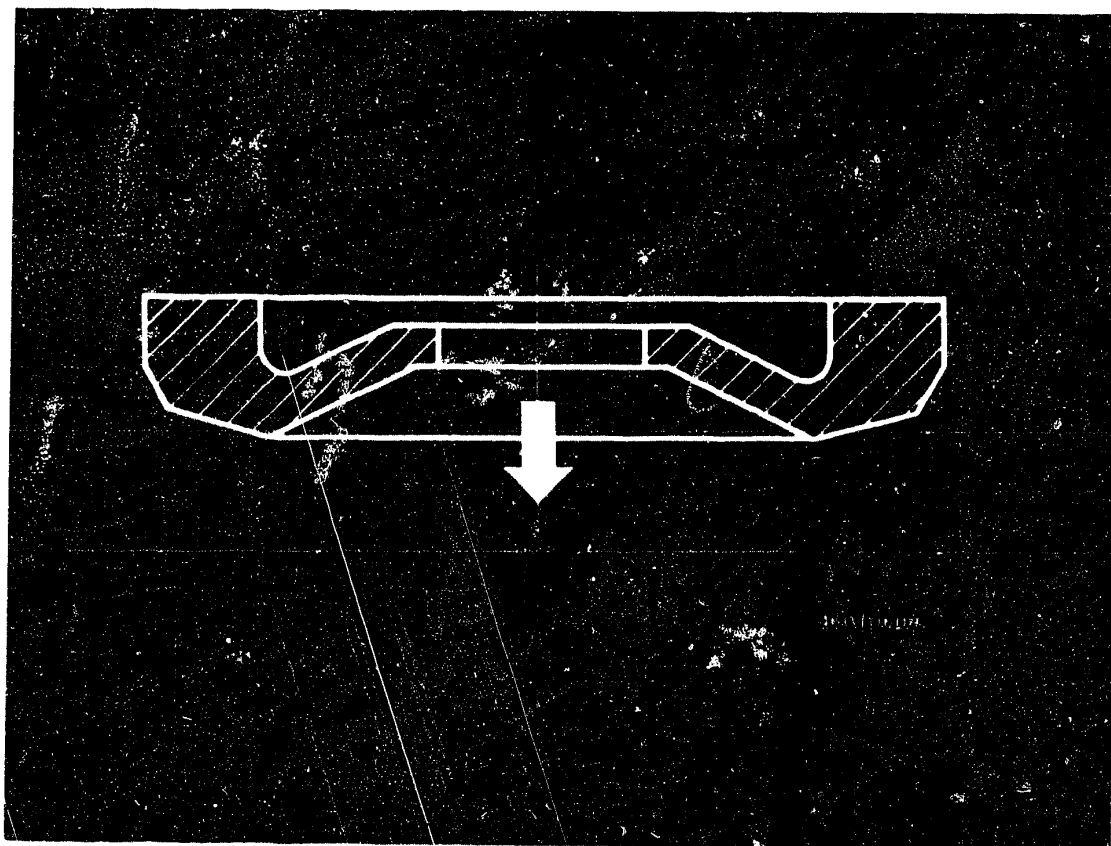
The spray must then be well atomized. The cross section of the spray has an oval shape and is larger than the spray of a throttling pintle nozzle without a flat on the pintle.

E3

Test injection nozzles

MB 200D, 250D, 300D (W 124)





21.5 Install injection nozzles

Before installing the injection nozzles, insert new heat-protection washers the right way round (see picture, arrow) in cylinder head (sealing cone 150° direction of combustion chamber).

Screw in nozzle-holder assembly and tighten to 70 - 80 Nm.

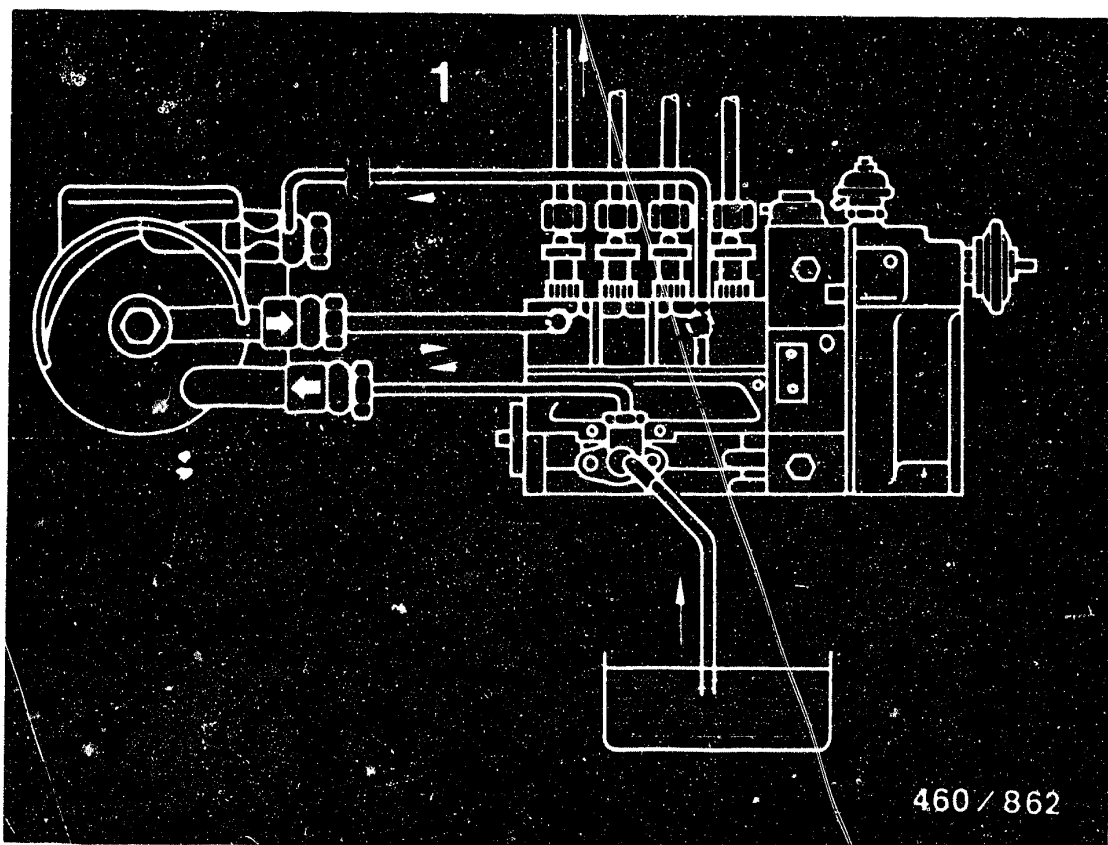
Secure union nuts of fuel-injection tubing to 10 - 20 Nm.

E4

Test injection nozzle

MB 200D, 250D, 300D (W 124)





22. Test fuel filter

Remove return line (1) from fuel filter and hold in measuring beaker.

Lock emergency stop lever in stop position.

Bring glow-plug and starter switch to position "0".

Using jumper cable (one connection to starting motor terminal 50, terminal 30 to battery positive) crank engine for 30 seconds.

If battery intact (10 V during cranking) a fuel delivery of approx. 200 ml/30 s must be reached.

E5

Test fuel filter

MB 200D, 250D, 300D (W 124)



If the value is not reached, check the following points.

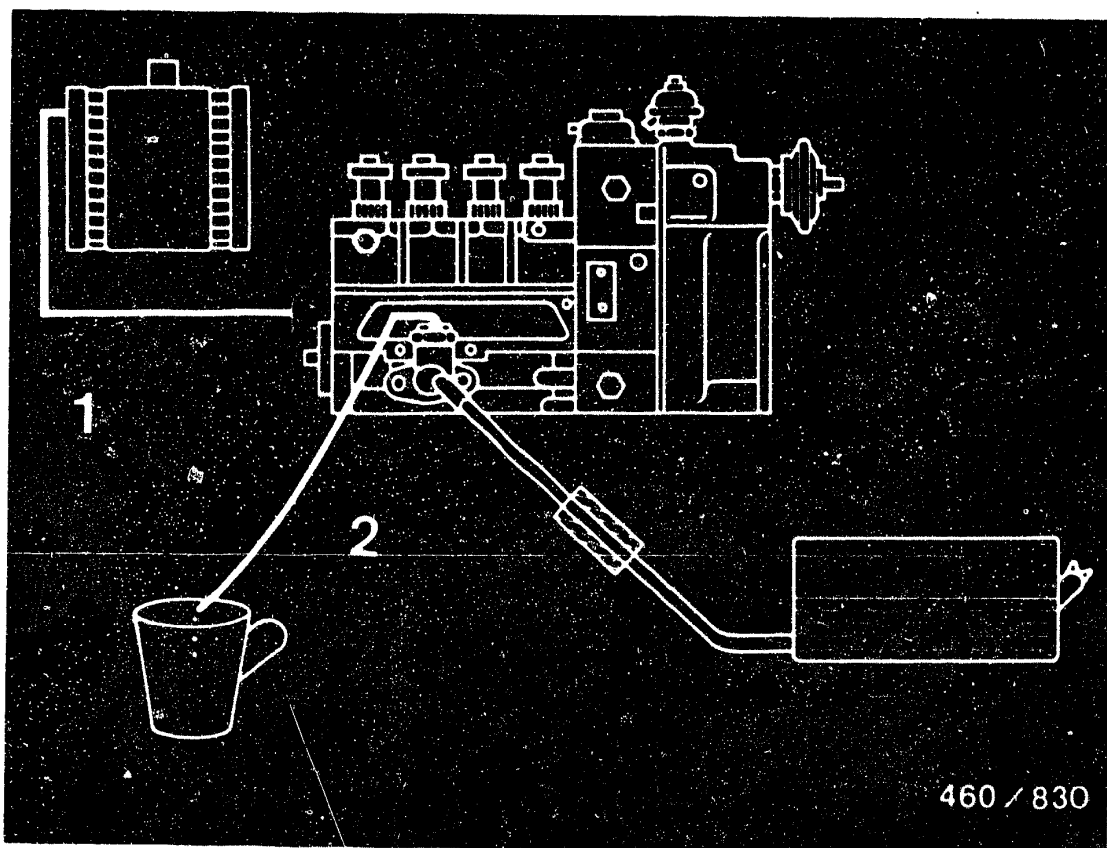
- Overflow valve on injection pump.
- Check fuel filter for fouling. If necessary, mount a new filter element with housing and seal ring.

E6

Test fuel filter

MB 200D, 250D, 300D (W 124)





460 / 830

23. Test fuel supply pump

23.1 Testing the fuel delivery

Loosen pressure line (1) on supply pump.

Connect test line (2) to supply pump and hold test line in measuring beaker.

Lock emergency stop lever in stop position.

Bring glow-plug and starter switch to position "0".

Using jumper cable (one connection to starting motor terminal 50, terminal 30 to battery positive) crank engine for 30 seconds.

If battery intact (10 V during cranking) a fuel delivery of approx. 200 ml/30 s must be reached.

E7

Test fuel filter

MB 200n, 250n, 300D (W 124)



24. Check pre-heating system

Note: the terminal diagram of the pre-heating system shown on the following Coordinates is for 4-cylinder engine 601, but is also valid for engine 602 (5-cylinder) and engine 603 (6-cylinder).

24.1 Necessary test equipment

VA tester	e.g. ETT 011.00	0 684 101 100
Multimeter with digital display		Commercially available

24.2 Workshop information

We recommend that the R-type sheathed-element glow plugs be replaced every 45 000 km.

Note:

If the start of delivery is incorrectly set, this may considerably shorten the service life of the sheathed element glow plug.

For each repeat start, the glow-plug and starter switch must - in order to obtain renewed pre-heating - first of all be turned to position 1 and then to position 2. This makes it possible to re-activate the safety circuit installed in the glow-duration unit.

24.3 Pre-heating time

The on-time of the pre-heating system is dependent on the ambient temperature.

24.4 Requirements

Battery fully charged.

Compression O.K. If necessary, check compression loss.

Fuel supply/fuel-injection system O.K.



24.5 Fault indication

A fault in the preheating system is indicated by the failure of the glow-plug indicator lamp to light up when the glow-plug and starter switch is in position 2.

The following faults are covered:

- Open circuit in lead term. 30 to glow-duration unit
- Fuse 80 A defective
- Power relay in glow-duration unit defective
- Open circuit in one or more leads to sheathed-element glow plugs
- One or more sheathed-element glow plugs defective



Starting motor operates, engine fails to start or starts only with great difficulty

yes

Test power supply to R-type sheathed-element glow plugs

Connect voltmeter to R-type sheathed-element glow plug and to ground.

Set glow-plug and starter switch to position 1 and then to position 2.

For at least 7 seconds (temperature-dependent) a minimum voltage of 10 V must be indicated. After this time the system switches off automatically.

Caution:

If the measurement has to be repeated, first of all set glow-plug and starter switch to position 1 and then to position 2.

Minimum voltage present?

yes

Test current consumption of R-type sheathed-element glow plugs.

Place current pickup over the individual leads to glow-duration unit one after the other.

Set glow-plug and starter switch to position 1 and then to position 2. After 10...20 seconds the current consumption of each sheathed-element glow-plug must be 8...15 A.

Current consumption reached?

yes

Continued on E12/E13

no

1. Voltage below 10 V, then test for voltage drop in power circuit (battery +) as well as term. 30 on glow-duration unit including 80 A fuse.

Eliminate voltage drop.

2. If no voltage, test for open circuit in leads between R-type sheathed-element glow plugs and glow-duration unit term. G1 - G4. Eliminate open circuit.

If no open circuit, continue on Coordinate E18/E19.

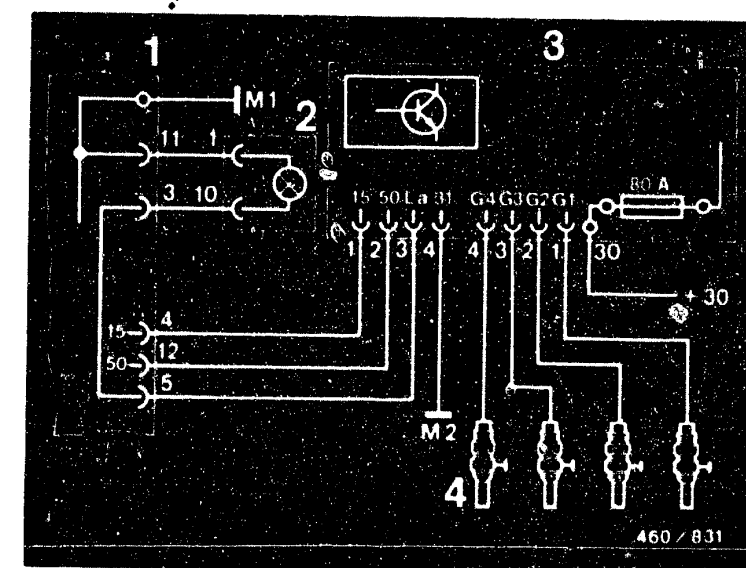
Not necessary to continue here.

no

If current consumption above 15 A, renew R-type sheathed-element glow plug. Below 8A, test for open circuit in electric lead or R-type sheathed-element glow-plug. To do this, disconnect 6-fold connector on glow-duration unit. Using ohmmeter, measure sockets 1...4 (corresponding to R-type sheathed-element glow plugs of cyl. 1...4) to ground (engine block) (see bottom picture).

Ohmmeter must indicate 0 Ω . If reading $\infty \Omega$ open circuit in lead or R-type sheathed-element glow plug.

Eliminate open circuit or replace R-type sheathed-element glow plug.



1 = Central-electrics console

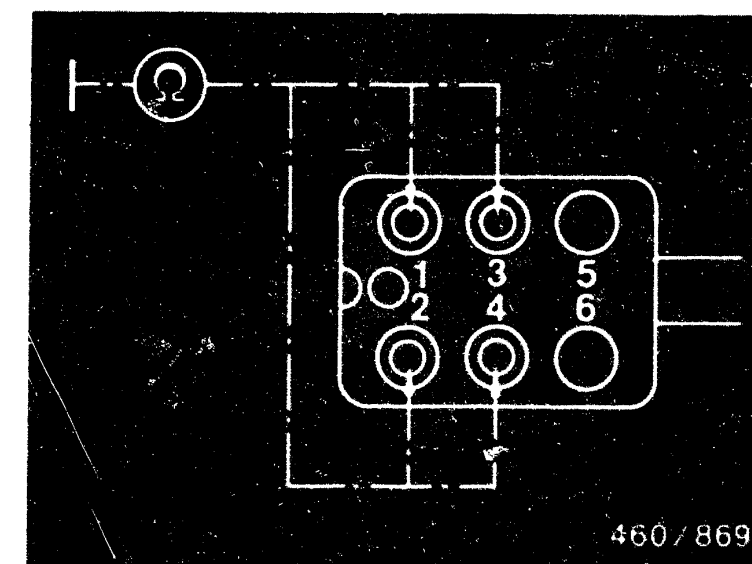
2 = Glow-plug indicator lamp (in instrument cluster)

3 = Glow-duration unit

4 = R-type sheathed-element glow plug

M 1 = Main ground (behind instrument cluster)

M 2 = Ground at front left (near lamp unit)



E10

Preheating system

MB 200D, 250D, 300D (W 124)



E11

Preheating system

MB 200D, 250D, 300D (W 124)



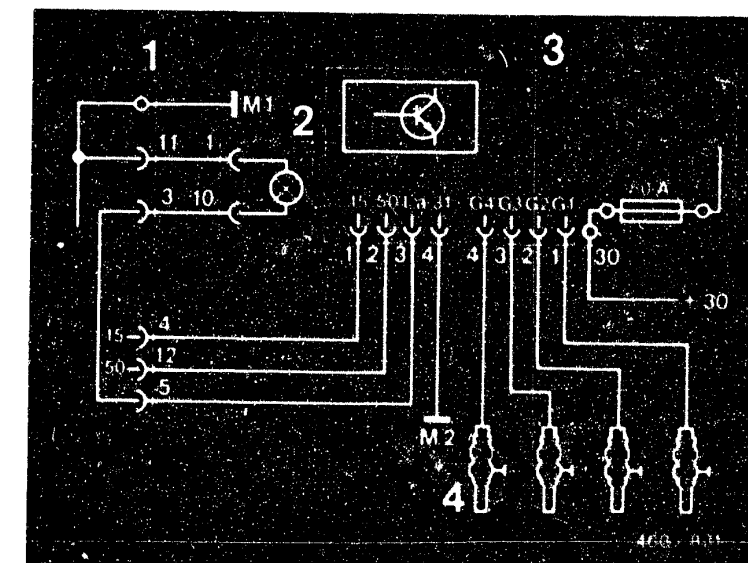
Test preheating system (continued)

yes

Note:

It is possible that the glow-plug indicator lamp (as a result of unfavourable tolerances) will indicate a fault only when 2 R-type sheathed-element glow plugs in cyl. 2...4 have failed.

To ensure that the fault indication in the glow-duration unit is not defective, disconnect 2 sheathed-element glow plugs of cyl. 2...4 and repeat preheating process. If indicator lamp now indicates a fault (not lit) glow duration unit is O.K.



- 1 = Central-electrics console
- 2 = Glow-plug indicator lamp (in instrument cluster)
- 3 = Glow-duration unit
- 4 = R-type sheathed-element glow plug
- M 1 = Main ground (behind instrument cluster)
- M 2 = Ground at front left (near lamp unit)

Test glow-plug indicator lamp

Set glow-plug and starter switch to position 1 and then to position 2. Glow-plug indicator lamp must light up. Glow-plug indicator lamp lit?

no

1. Test for open circuit in lead between central-electrics console term. 4 and glow-duration unit term. 15. Eliminate open circuit.
2. Test for open circuit in lead between glow-duration unit term. 1a and glow-plug indicator term. 10 including ground lead term. 1 to main ground (behind instrument cluster). Eliminate open circuit.

yes

Continued on E14/E15

E12

Test preheating system

MB 200D, 250D, 300D (W 124)



E13

Test preheating system

MB 200D, 250D, 300D (W 124)



Test preheating system (continued)

yes

Test preheating time

Set glow-plug and starter switch to position 1 and then to position 2. The preheating time (glow-plug indicator lamp lit) depends on the engine compartment temperature. See graph.

Preheating time (seconds) O.K.?

no

Renew glow-duration unit.

yes

Test safety switch-off circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Set glow-plug and starter switch to position 1 and then to position 2.

The time for the safety switch-off is no longer rigidly specified. It results from the time up to readiness for starting (going out of glow-plug indicator lamp) plus 20 - 35 seconds. During this time the voltmeter must indicate voltage (see graph).

After this time the voltmeter must indicate 0 V.

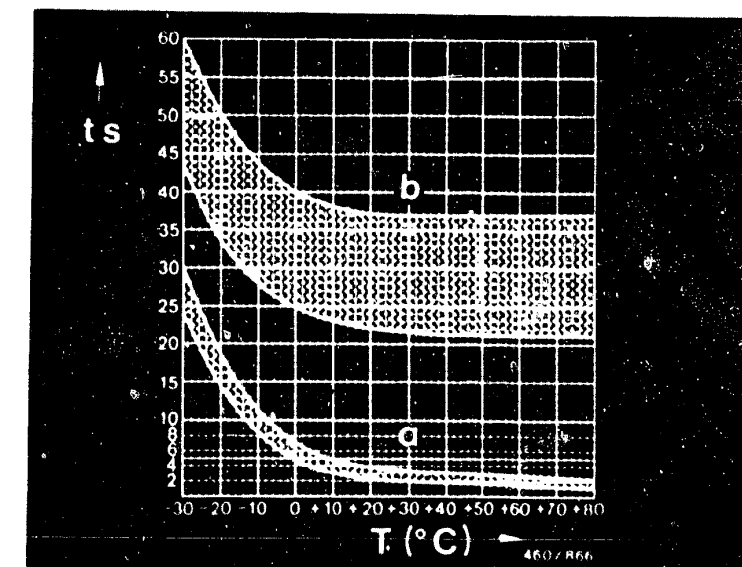
Voltmeter at 0 V after specified time?

no

Renew glow-duration unit.

yes

Continued on E16/E17



t_s = Time in seconds

$T^{\circ}\text{C}$ = Engine-comp.temp.

a = Preheating time

b = Safety switch-off

E14

Test preheating system

MB 200D, 250D, 300D (W 124)



E15

Test preheating system

MB 200D, 250D, 300D (W 124)



Test preheating system (continued)

yes

Test preheating when operating starting motor

Connect voltmeter to R-type sheathed-element glow plug and to ground.

Set glow-plug and starter switch to position 2. Voltmeter must indicate approx. 10 V.

Voltage present?

no

1. Test for open circuit in lead between glow-plug and starter switch term. 50 and glow-duration unit term. 50. Eliminate open circuit.

2. If point 1 O.K., renew glow-duration unit.

yes

Test R-type sheathed-element glow plugs

Using ohmmeter, test R-type sheathed-element glow plugs individually for continuity. O.K.?

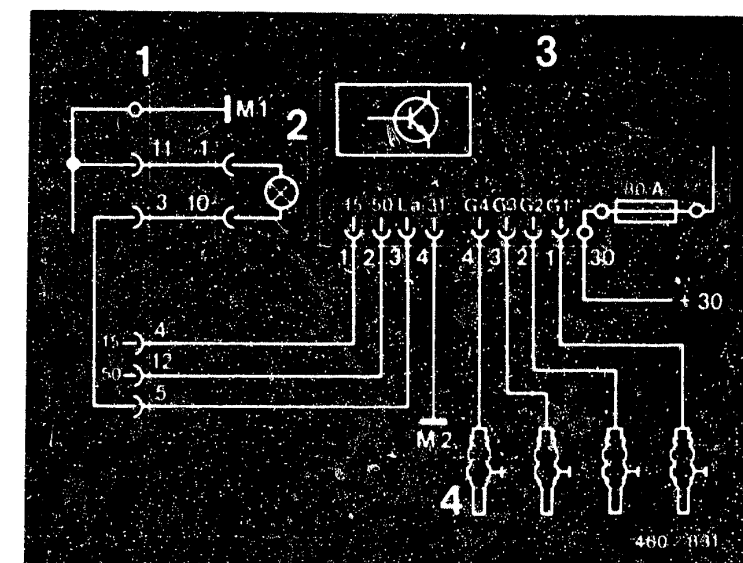
no

Renew R-type sheathed-element glow plugs.

yes

Preheating system O.K.

Tests as of E18 not necessary.



1 = Central-electrics console

2 = Glow-plug indicator lamp (in instrument cluster)

3 = Glow-duration unit

4 = R-type sheathed-element glow plug

M 1 = Main ground (behind instrument cluster)

M 2 = Ground at front left (near lamp unit)

E16

Test preheating system

MB 200D, 250D, 300D (W 124)



E17

Test preheating system

MB 200D, 250D, 300D (W 124)



Test preheating system (continued from E10/E11)

Test voltage at glow-duration unit term. 15
Disconnect 4-pin plug from glow-duration unit. Connect voltmeter to plug socket 1 and plug socket 4. Set glow-plug and starter switch to position 1 and then to position 2. The voltmeter must indicate battery voltage. Battery voltage present?

no

Test for open circuit in lead between glow-duration unit term. 15 and glow-plug and starter switch. Eliminate open circuit.

yes

Test ground lead term. 31 from glow-duration unit.
Connect voltmeter to glow-duration unit plug term. 31 and battery +. Voltmeter must indicate battery voltage. Battery voltage present?

no

Test for open circuit in ground lead term. 31 from glow-duration unit. Eliminate open circuit.

yes

Test voltage at glow-duration unit term. 30 and 80 A fuse
Connect voltmeter to glow-duration unit, once before and once after 80 A fuse, and to ground. In either case voltmeter must indicate battery voltage. Battery voltage present?

no

1. Test 80 A fuse - renew if necessary.
2. Test for open circuit in lead between glow-duration unit term. 30 and battery + through engine cable connector term. 30. Eliminate open circuit.

yes

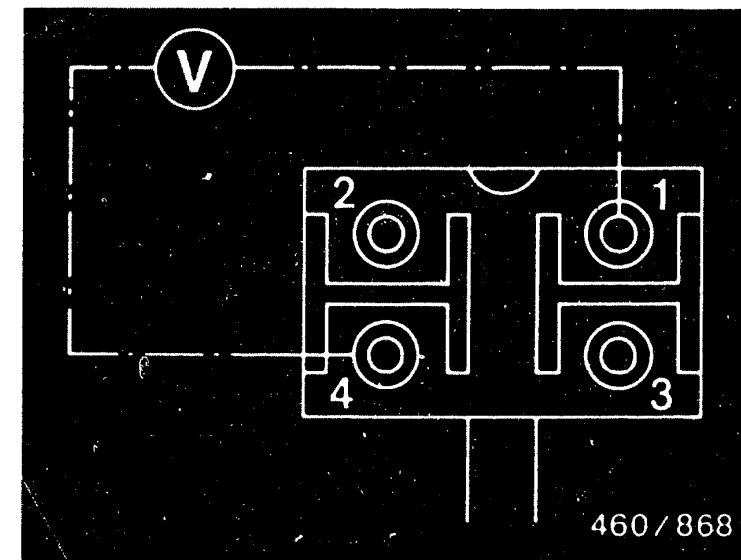
Voltage now present at R-type sheathed-element glow-plug.

no

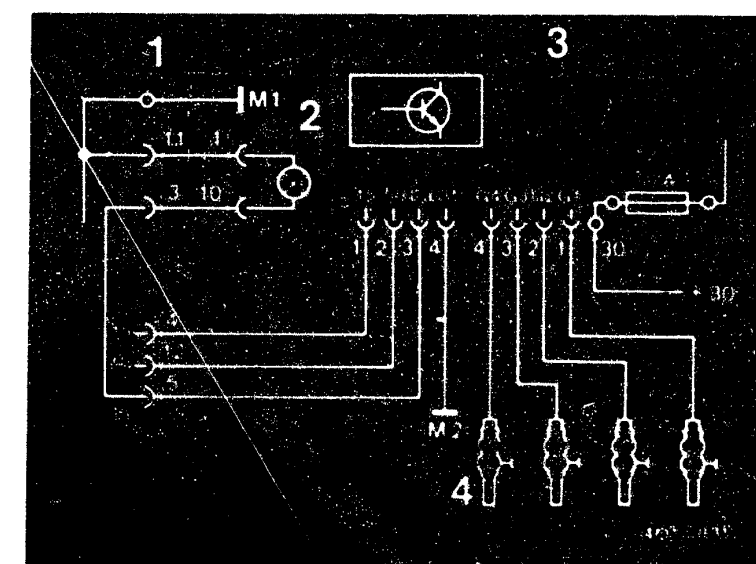
Renew glow-duration unit.

yes

Continued on E20/E21



- 1 = Central-electrics console
- 2 = Glow-plug indicator lamp (in instrument cluster)
- 3 = Glow-duration unit
- 4 = R-type sheathed-element glow plug
- M 1 = Main ground (behind instrument cluster)
- M 2 = Ground at front left (near lamp unig)



E18

Test preheating system
MB 200D, 250D, 300D (W 124)



E19

Test preheating system
MB 200D, 250D, 300D (W 124)



Test preheating system (continued)

yes

Test glow-plug indicator lamp

Set glow-plug and starter switch to position 1 and then to position 2. Glow-plug indicator lamp must light up.
Glow-plug indicator lamp lit?

no

1. Test bulb, renewing if necessary. If bulb O.K., test for open circuit in lead between central-electrics console term. 4 and glow-duration unit term. 15. Eliminate open circuit.
2. Test for open circuit in lead between glow-duration unit term. 1a (plug socket 3) and glow-plug indicator lamp term. 10 including ground lead term. 1 to main ground (behind instrument cluster). Eliminate open circuit.

yes

Test preheating time

Set glow-plug and starter switch to position 1 and then to position 2.
The preheating time (glow-plug indicator lamp lit) depends on the engine compartment temperature. See bottom graph.

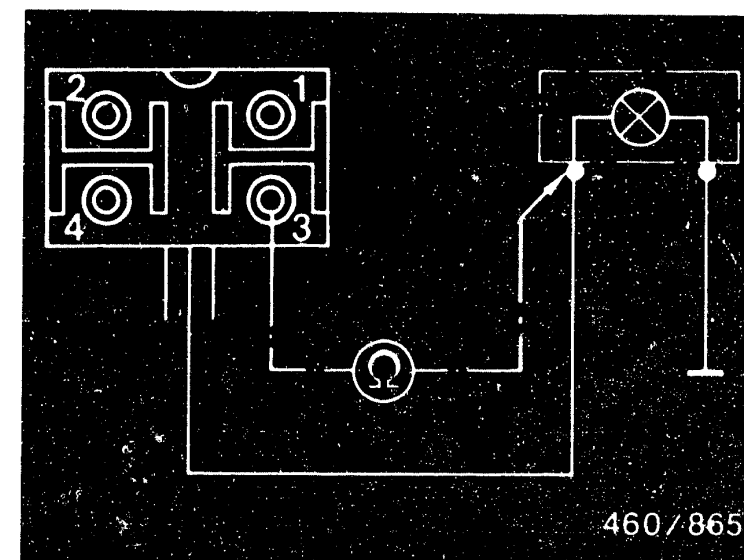
Preheating time (seconds) O.K.?

no

Renew glow-duration unit.

yes

Continued on E22/E23



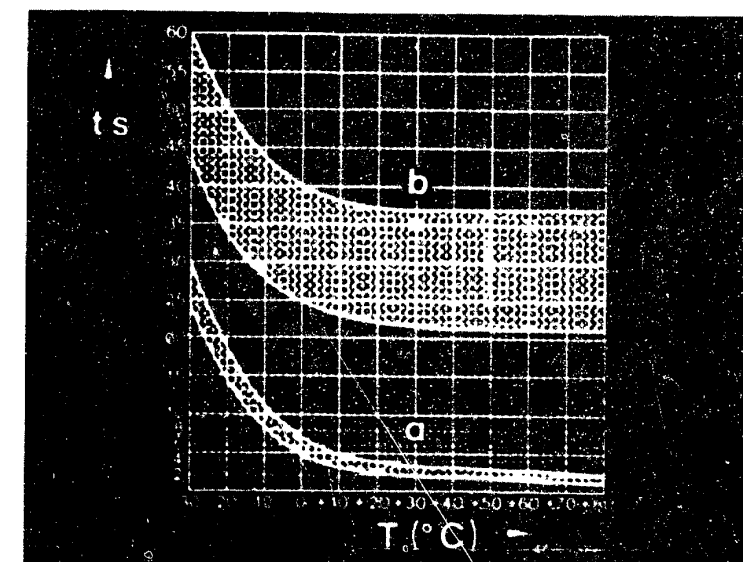
460/865

t_s = Time in seconds

T °C = Engine comp. temp.

a = Preheating time

b = Safety switch-off



E20

Test preheating system

MB 200D, 250D, 300D (W 124)

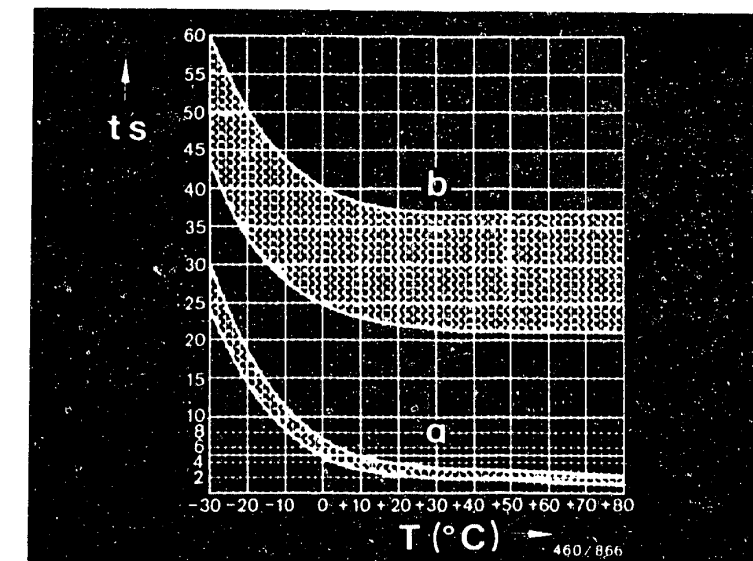
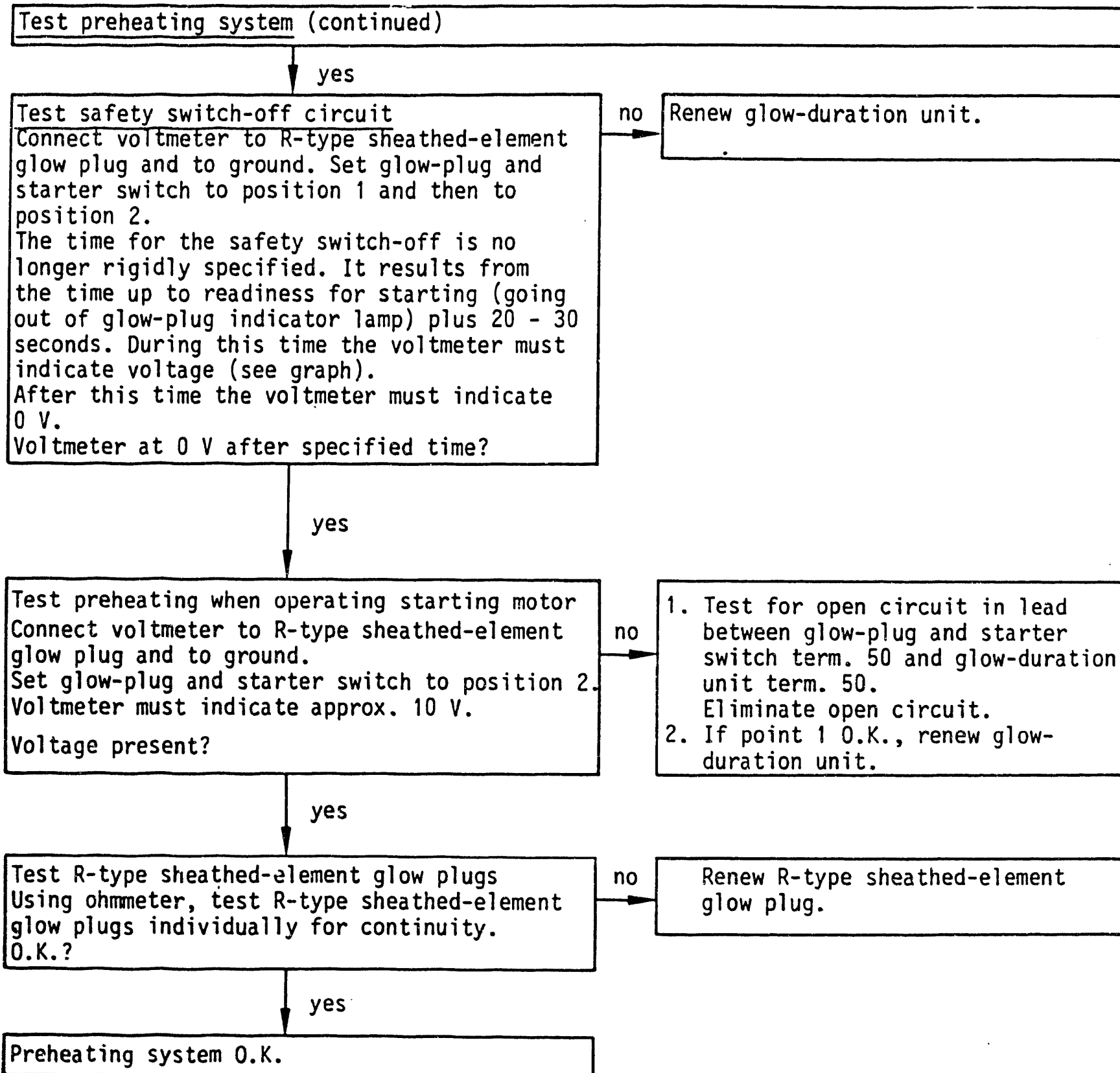


E21

Test preheating system

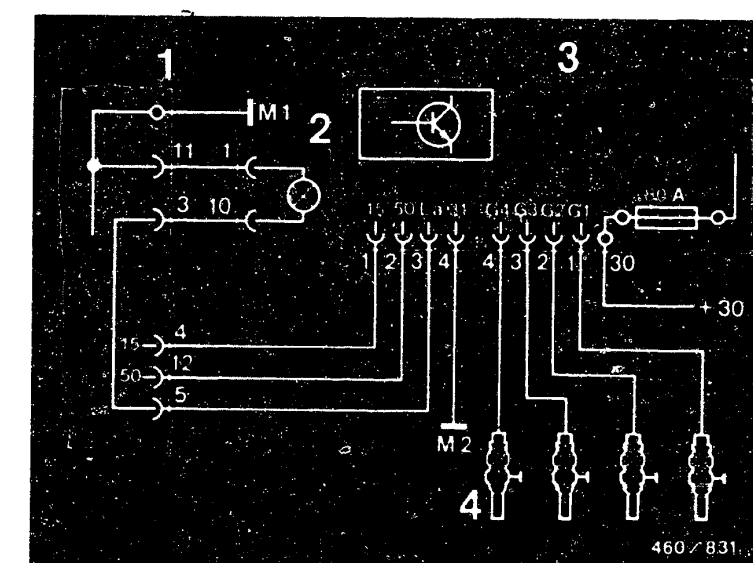
MB 200D, 250D, 300D (W 124)





t_s = Time in seconds
 T °C = Engine comp. temp.
 a = Preheating time
 b = Safety switch-off

1 = Central-electrics console
 2 = Glow-plug indicator lamp
 3 = Glow-duration unit
 4 = R-type sheathed-element glow plug



E22

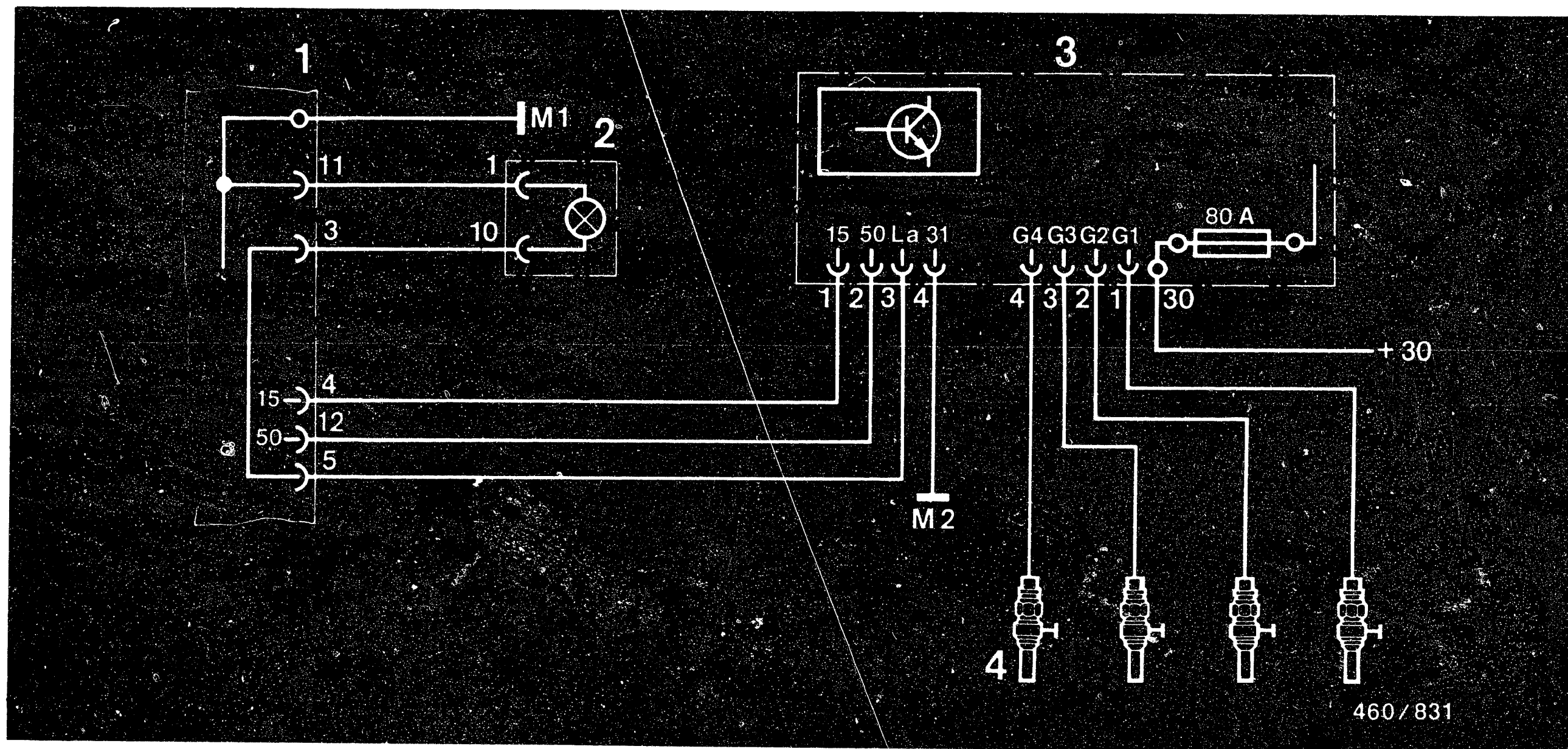
Test preheating system
 MB 200D, 250D, 300D (W 124)



E23

Test preheating system
 MB 200D, 250D, 300D (W 124)





460/831

1 = Central-electrics console
 2 = Glow-plug indicator lamp in instrument cluster
 3 = Glow-duration unit
 4 = Sheathed-element glow plugs

M 1 = Main ground behind instrument cluster
 M 2 = Ground at front left (near lamp unit)

24.6 Terminal diagram for preheating system

Valid for 4, 5 and 6 cylinder engines (4 cylinder engine shown in picture)

F1

Test preheating system

MB 200D, 250D, 300D (W 124)



F2

Test preheating system

MB 200D, 250D, 300D (W 124)



25. Check operation of timing device

The operation of the timing device is checked by means of governor pulse and TDC pickup.

As the engine speed rises the governor pulse is advanced by the timing device.

The start of delivery reading becomes smaller and, at maximum advance, reaches approx. 1° after TDC.

Note: The advance in degrees must take place briskly and smoothly.

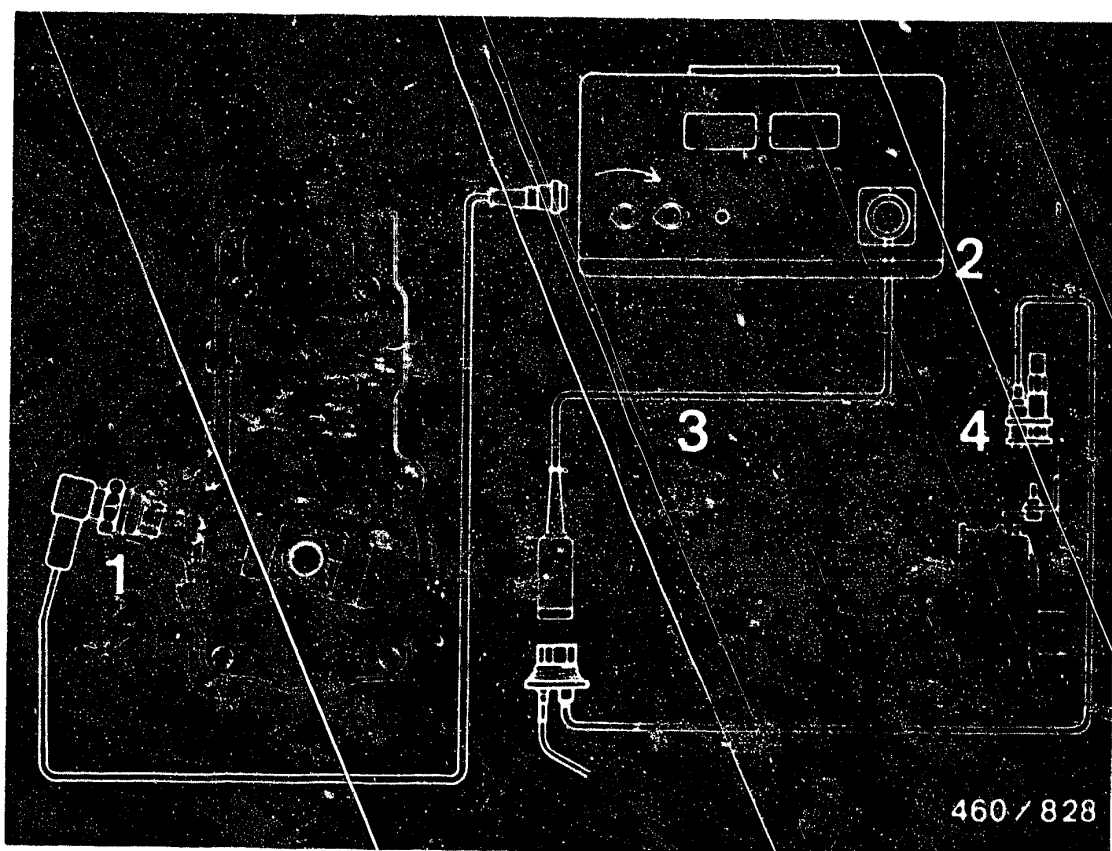
If no advance is detectable, the timing device is defective.

F3

Check timing device

MB 200D, 250D, 300D (W 124)





- 1 = Governor pulse generator, Daimler Benz part no.
617 589 102 100
- 2 = Diesel engine tester ETD 019.00, Bosch part no.
0 684 101 900
- 3 = Adapter lead, Bosch part no. 1 684 463 147
- 4 = TDC pickup, engine 601, Daimler-Benz part no.
601 589 042 100
TDC pickup, engine 602/603, Daimler-Benz part no.
603 589 002 100

25.1 Connection diagram for testing operation of timing device with diesel engine tester ETD 019.00

F4

Check timing device

MB 200D, 250D, 300D (W 124)



26. Measure engine compression and compression loss

26.1 Measure engine compression

Fit new chart in compression tracer. Mount high-pressure hose on tracer. Remove nozzle-holder assembly.

Turn engine over several times using starting motor so that loose carbon residues are removed from the compression space.

Screw connecting nipple of pressure tracer into opening of nozzle-holder assemblies.

Mount high-pressure hose of pressure tracer on connecting nipple.



During the following operation, note first compression stroke in particular.

Operate starting motor until there is no longer any detectable rise in pressure on the compression tracer.

Bleed compression tracer by pressing on bleeder valve.

The pointer returns to the starting position.

Move chart onto next position.

Fit connecting nipple to the other cylinders and repeat measurement.

Compression pressure	Allowable difference between cylinders
24 - 30 bar	max. 20%
Wear limit approx. 18 bar	



26.1.1 Evaluation of chart

1. Normal pressure rise

If piston rings and valves are in good condition, the first compression stroke shows the highest pressure increase. During the following compression strokes the compression builds up to the maximum pressure.

2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

3. Low maximum pressure

If the maximum compression obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.

If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.



4. Varying compression

If one cylinder shows a clearly lower compression, proceed as follows: Fill in 2 - 3 cm³ of engine oil through the opening of the sheathed-element glow plug or nozzle holder and operate starting motor briefly.

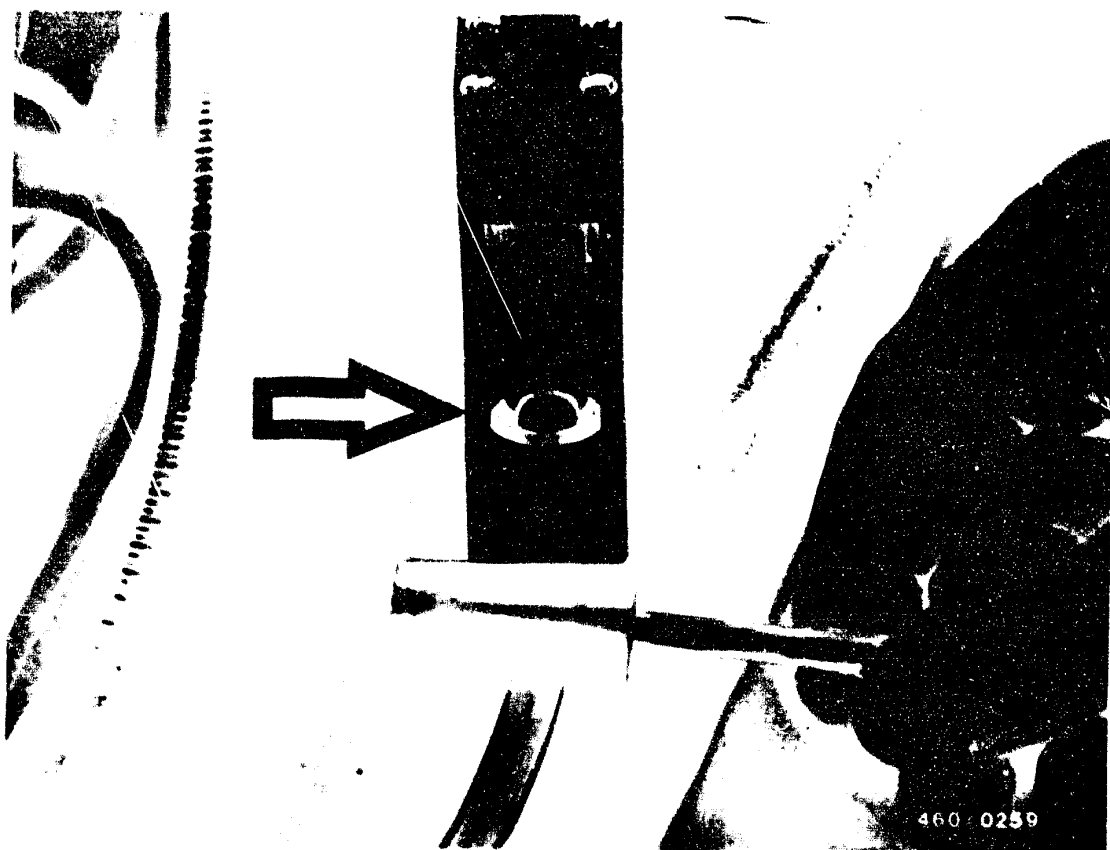
Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn.

If there is no change in the result, then defective valves are the cause.

5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.





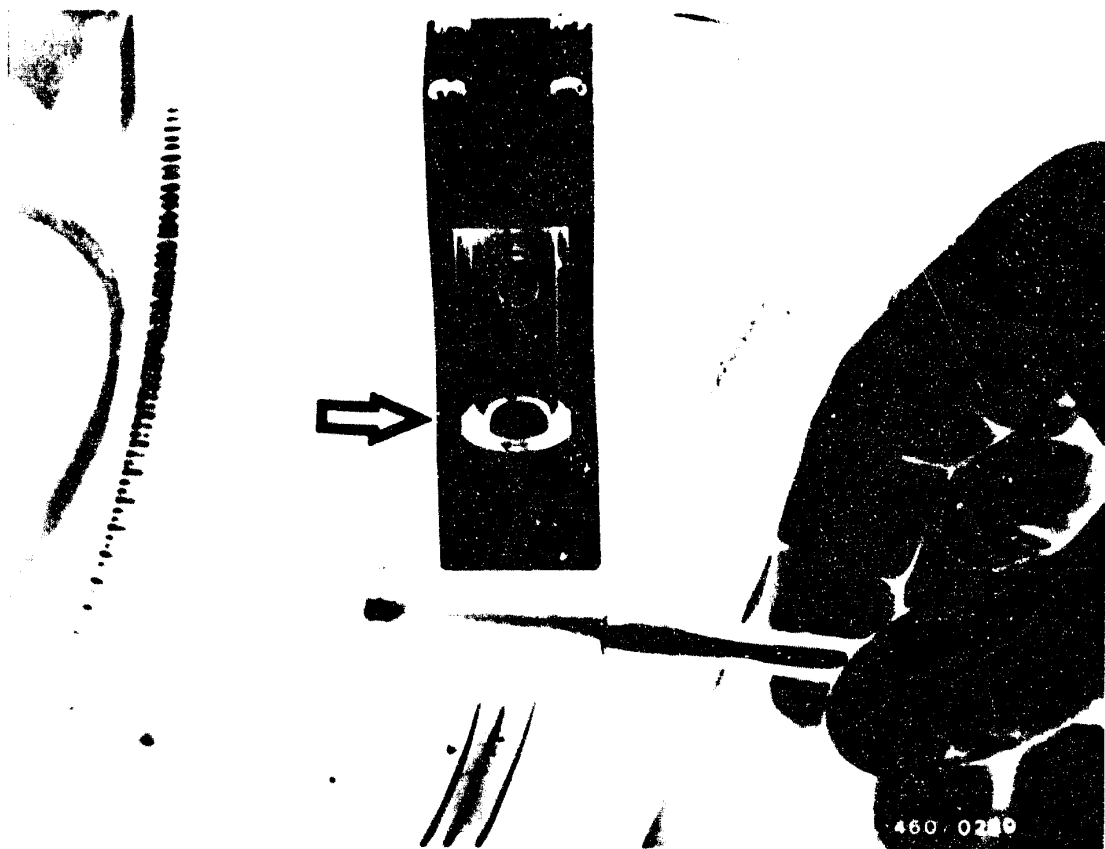
26.2 Measuring the compression loss of the engine

The test is performed using the BOSCH compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester).

Perform test with engine at normal operating temperature (temperature of water approx. 80°C).



26.2.1 Set top dead centre

Remove sheathed-element glow plug from cylinder 1.

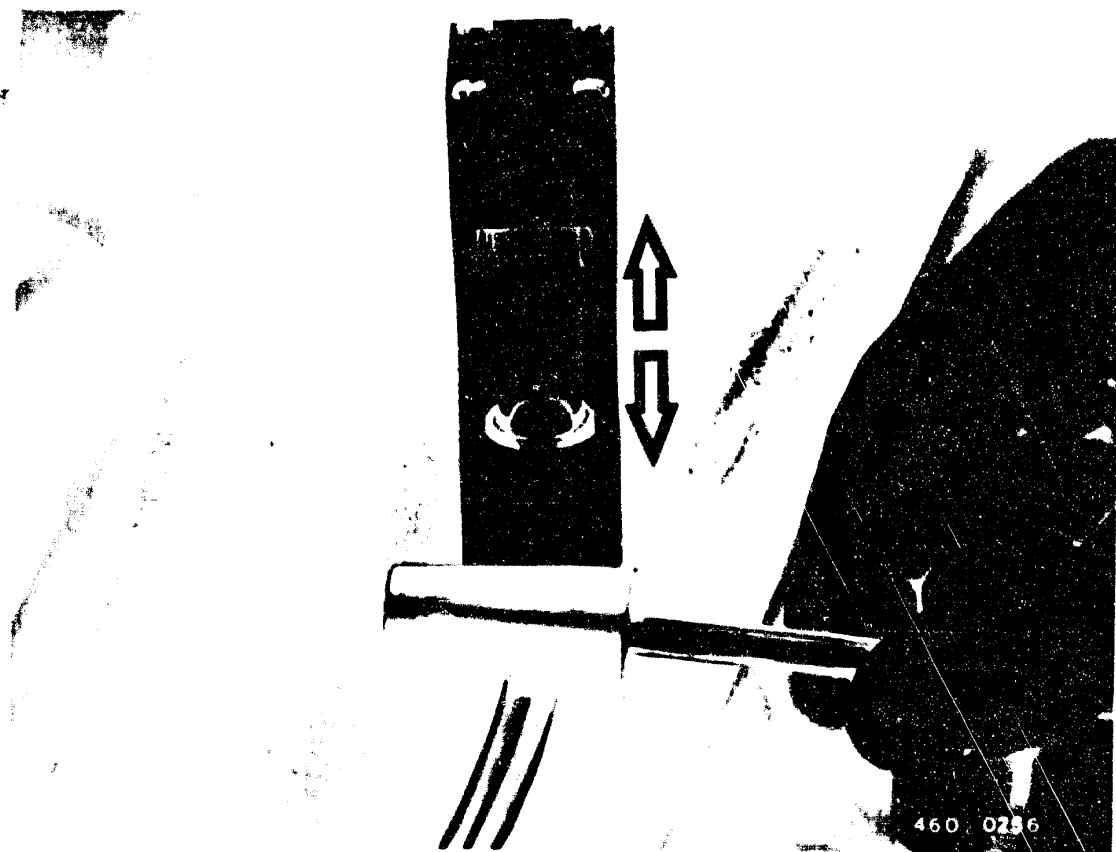
Insert rubber plug of DC detector into bore for sheathed-element glow plug.

Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment.

- The piston of the unit must be easily visible.

Slowly turn the engine over by hand in its direction of rotation. (If necessary, select gear and push vehicle).





On the compression stroke, the piston of the DC detector is forced upwards.

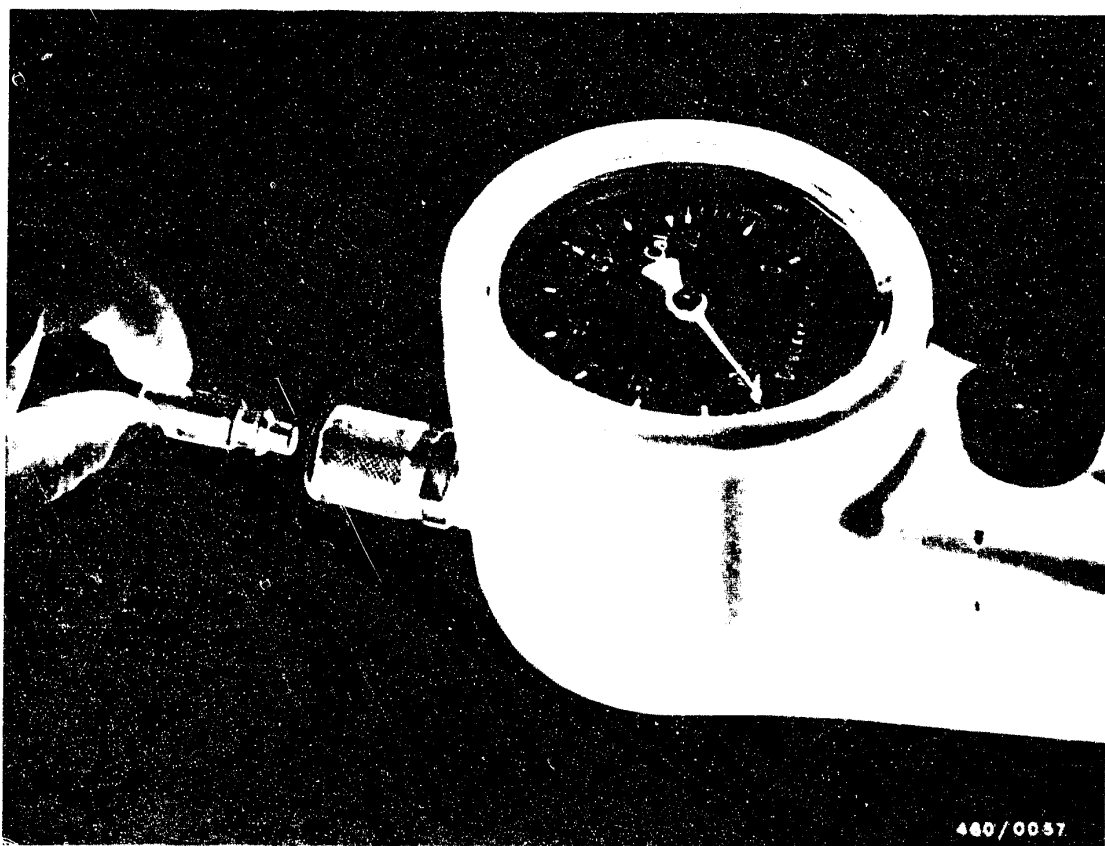
As top dead centre is passed over, the piston slides down again immediately.

Locate top dead centre by carefully turning the engine backwards and forwards.

F11

Measuring engine comp. and comp. loss
MB 200D, 250D, 300D (W 124)

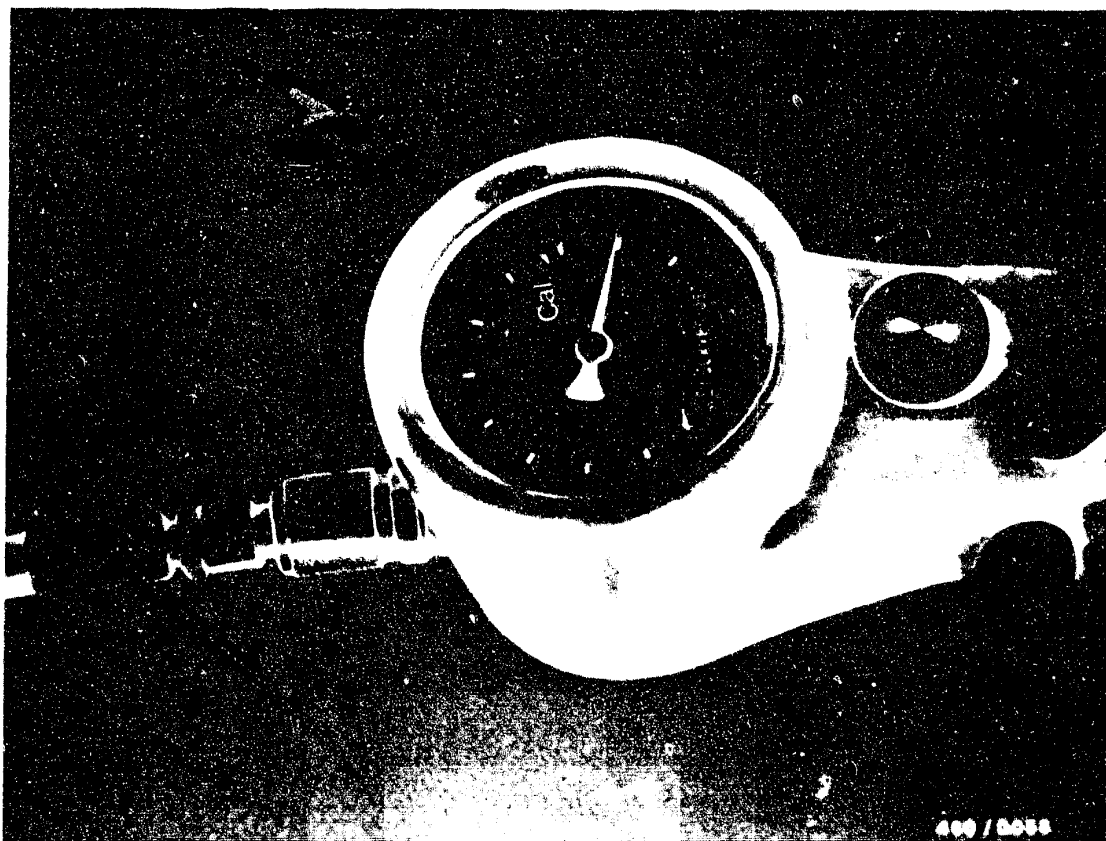




26.2.2 Measuring compression loss

Connect tester to compressed-air mains.
Connect calibrating nozzle 1 680 363 036. Set a compression loss of $23 \pm 1\%$ (marking "Cal") at the knurled thumbscrew on the pressure-regulating valve.
Disconnect calibrating nozzle.
Instrument indicator must show approximately 0% compression loss (equipment check).

Remove sheathed-element glow plug.



Nozzle-holder assemblies removed. Screw connecting nipple into opening of nozzle-holder assembly.
Screw in fitting and mount test hose.
Select gear and pull on handbrake.
Connect test hose to tester.
Read off compression lost in % on instrument.

Note:

Before testing the next cylinder, turn the engine over briefly without preheating using the starting motor so that the oil film re-forms.

F13

Measure engine comp. and comp. loss
MB 200D, 250D, 300D (W 124)



26.2.3 Evaluation of test

The compression loss indicated should not exceed 25%.

Differences of 10% between the individual cylinders can be ignored.

The causes of greater losses can be located because the air makes a noise as it escapes.

Listen at the following points:

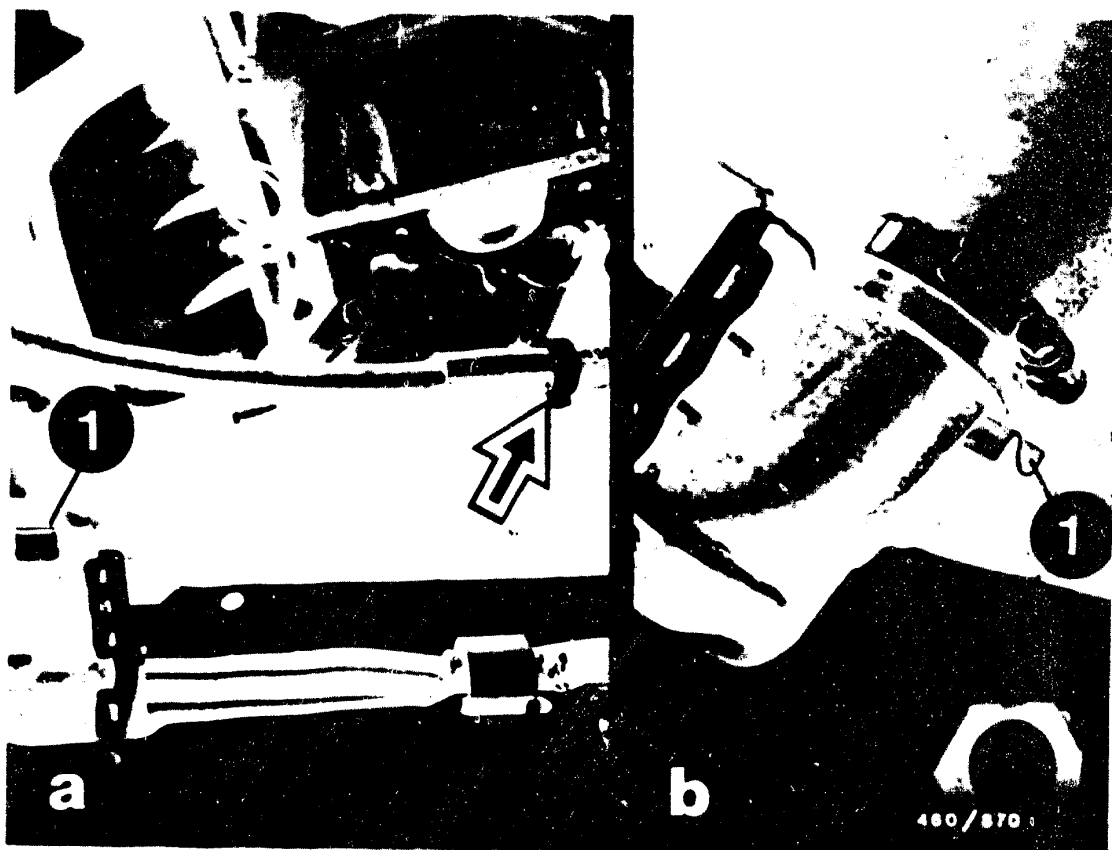
<u>Location of noise</u>	<u>Possible trouble</u>
Intake manifold (remove air filter)	Intake valve
Exhaust manifold	Exhaust valve
Oil filler neck on engine	Pistons, piston rings
Cooling water filler neck (air bubbles)	Cylinder head gasket

In order to trace the trouble even more accurately, fill approximately 2-3 cm³ of engine oil into the cylinder. Repeat test.

If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.

New engines which have not yet been run in (less than 5000 km) may show higher compression losses than after the running-in period.





1 = Fan shrouds

27. Work on fuel-injection pump

27.1 Remove fuel-injection pump

Disconnect negative cable from battery.
Remove fan shrouds (see pictures a and b) and hose binder (arrow, picture a).



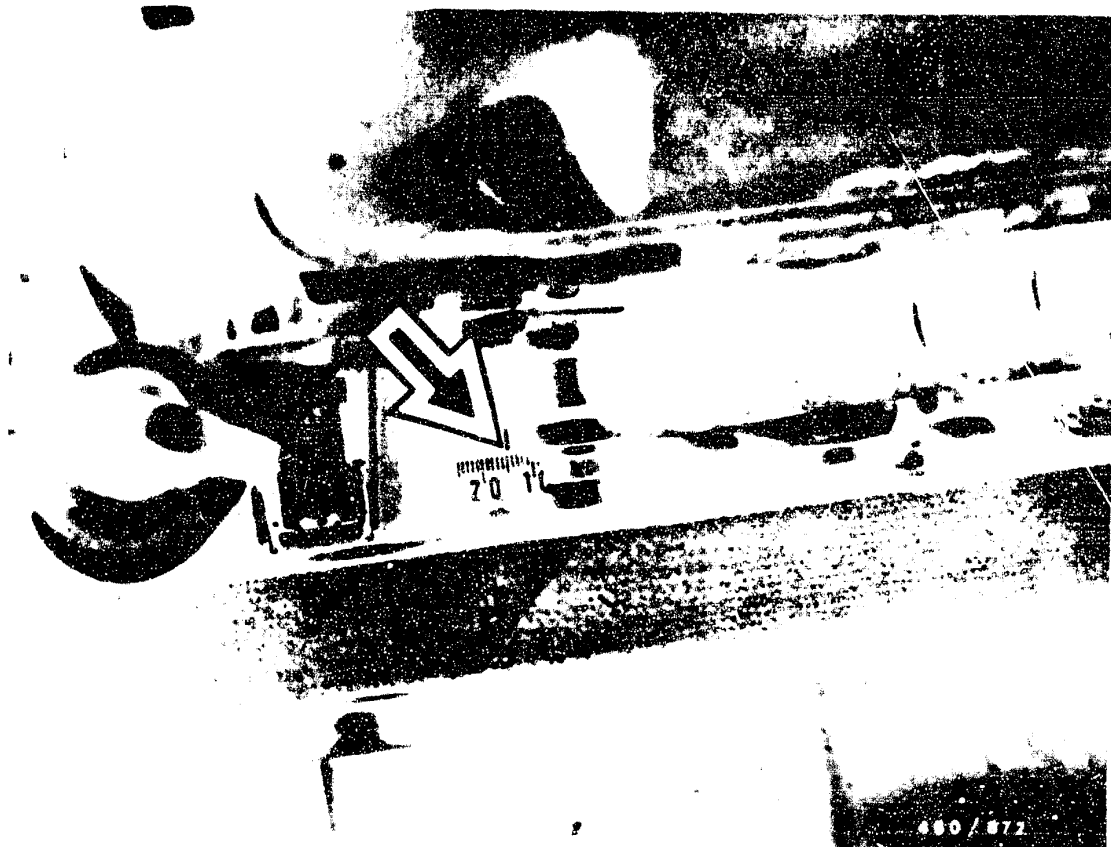


Unscrew fan fastening screw (arrow).
Remove fan and fan cover on radiator.
Remove front noise capsule.

F16

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





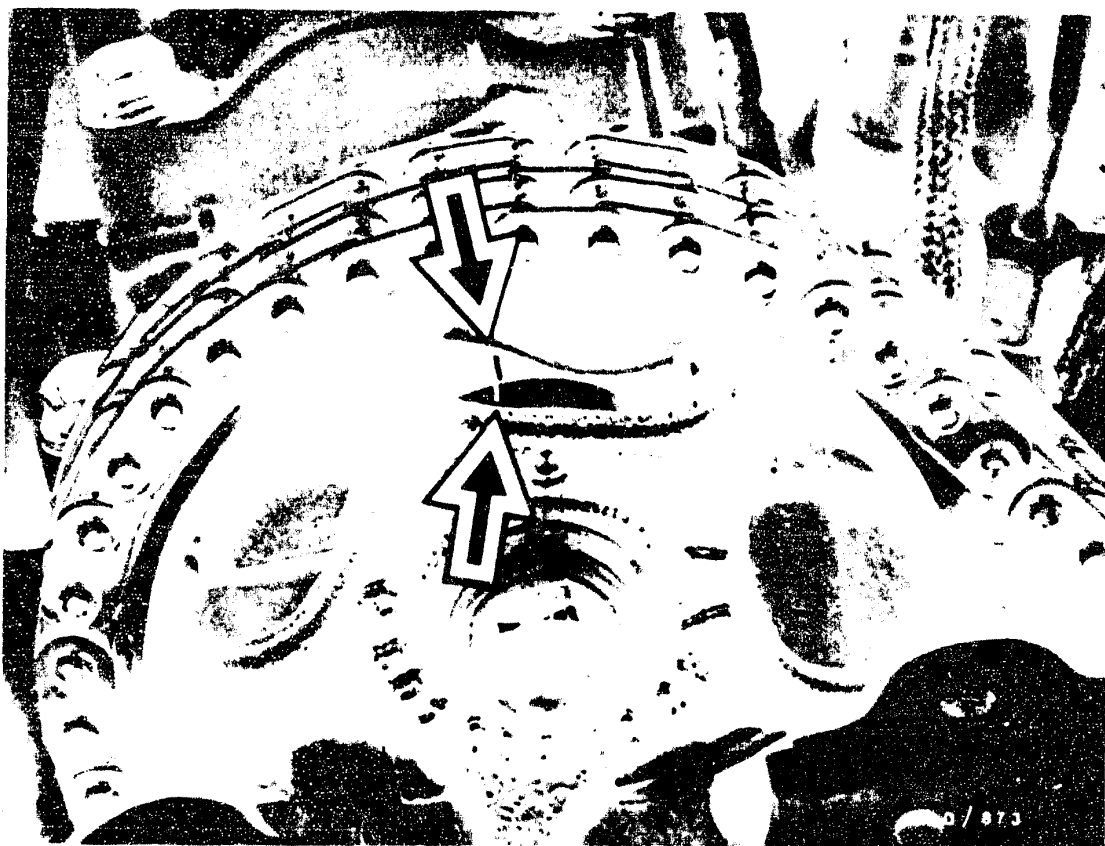
Turn crankshaft in engine direction of rotation to 15° ATDC on cylinder 1 (see picture, arrow).

F17

Remove fuel-injection pump

MB 200D, 250D, 300D (W 124)





Note:

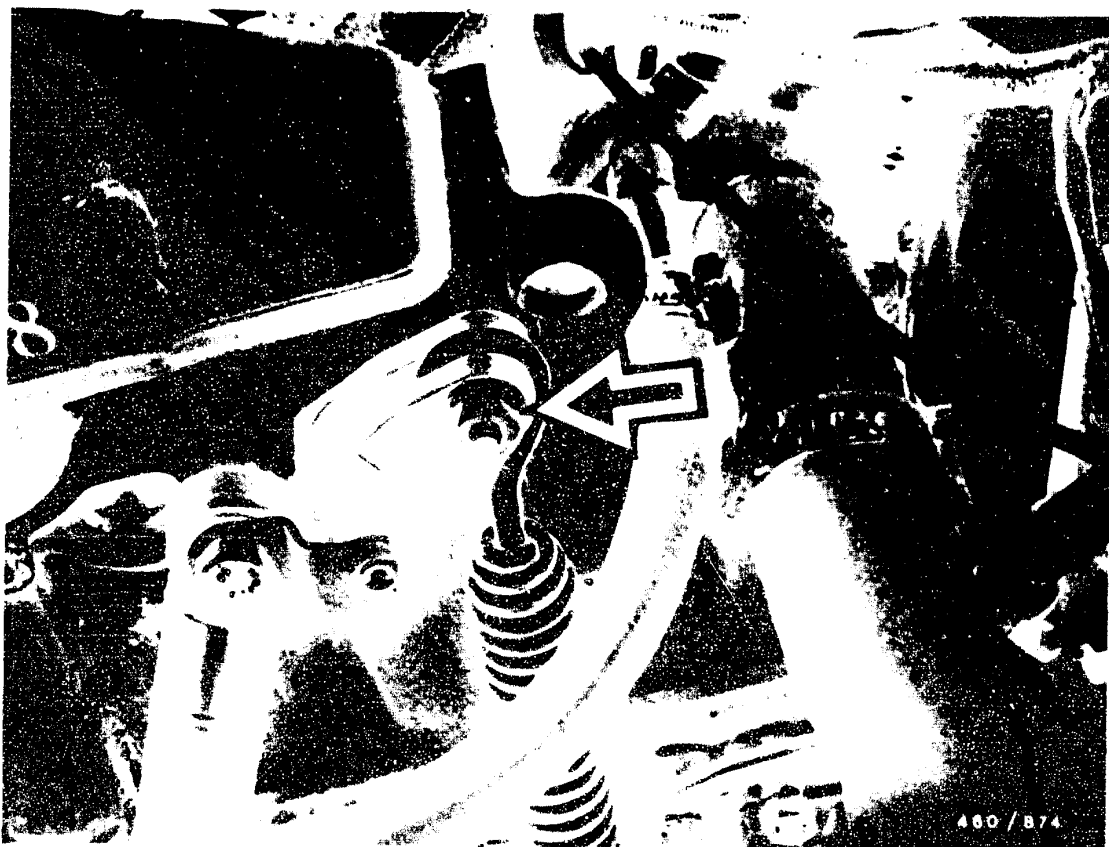
With the piston of cylinder 1 at TDC, the notch on the front collar of the camshaft must align with the rib on the 1st camshaft bearing (see picture, arrows).

Valves of cylinder 4 are on overlap. (Visible after removing the cylinder head cover).

F18

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)



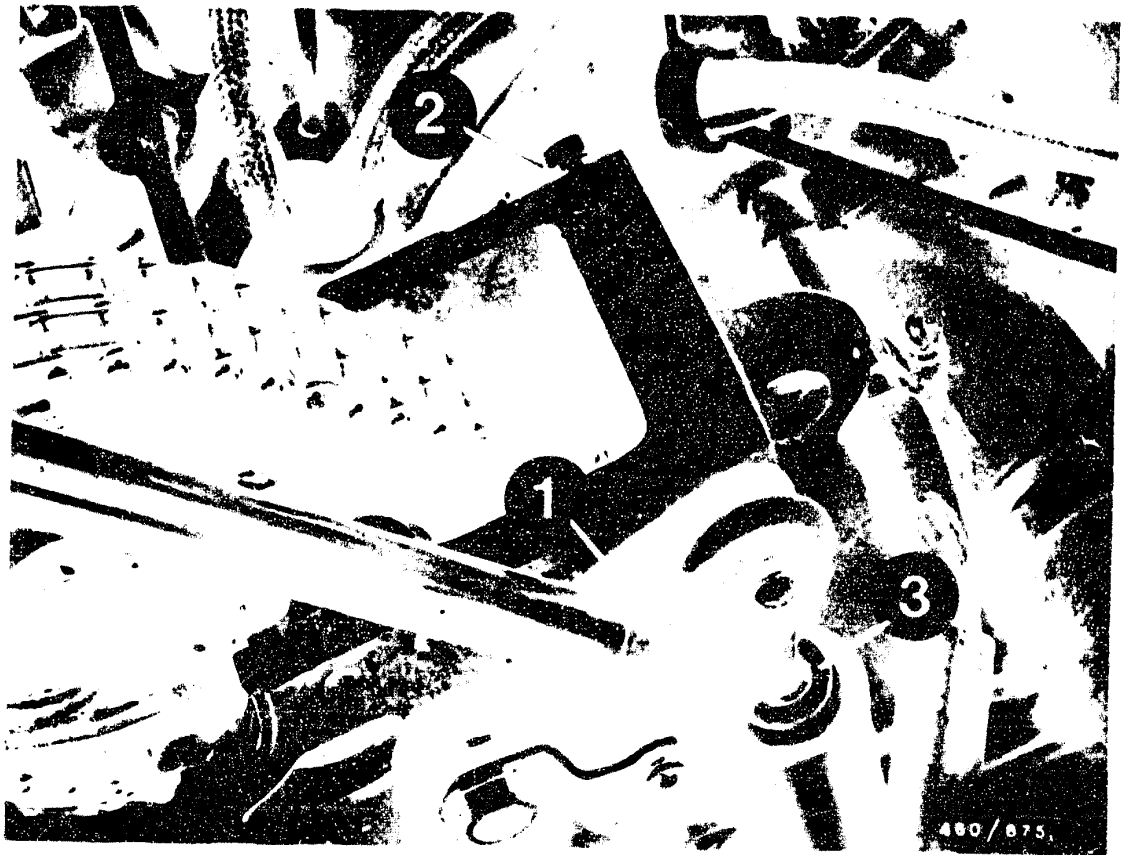


Unscrew belt tensioner fastening nut (see picture, arrow).

F19

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





- 1 = Spring tensioning lever
- 2 = Fastening screw
- 3 = Extension spring

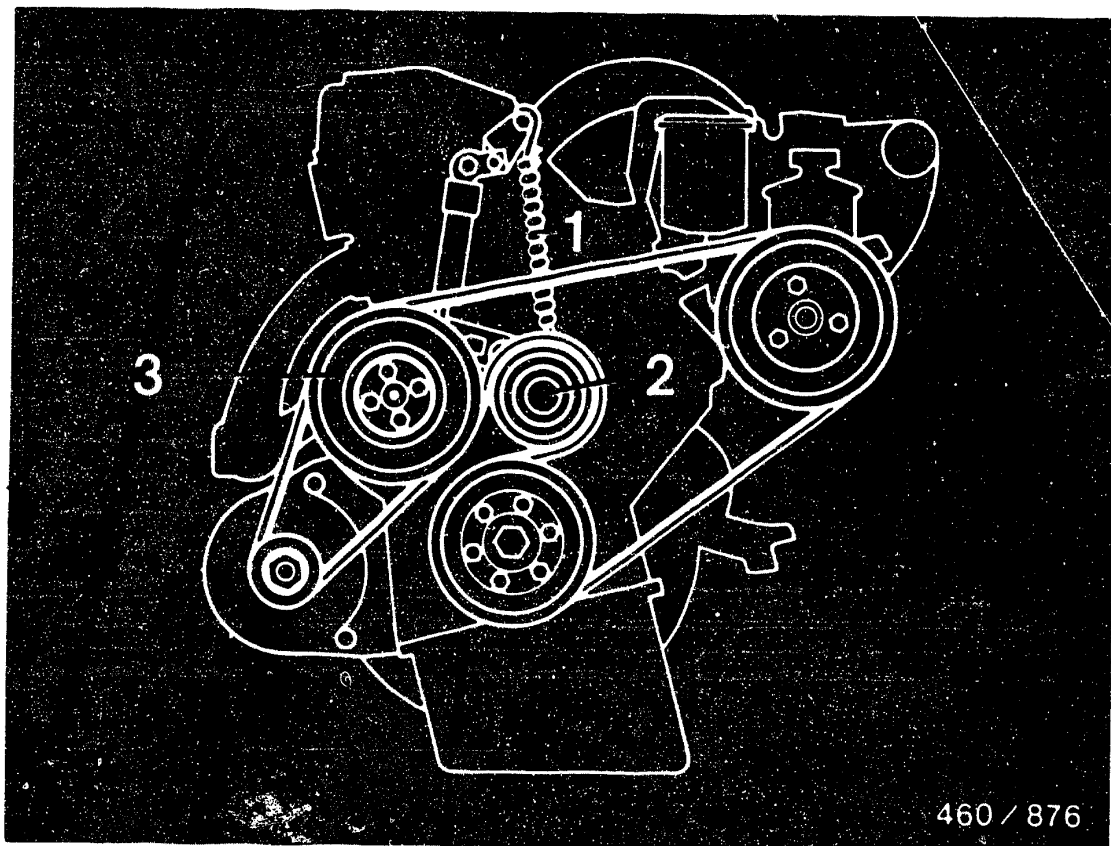
Stick lever or mandrel (12 - 13 mm \varnothing , approx. 300 mm long) into bore on spring tensioning lever (1). Press lever slightly to the left until fastening screw (2) can be pushed back.

Relax extension spring (3). To do this, slowly pivot lever to the right.

F20

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





460 / 876

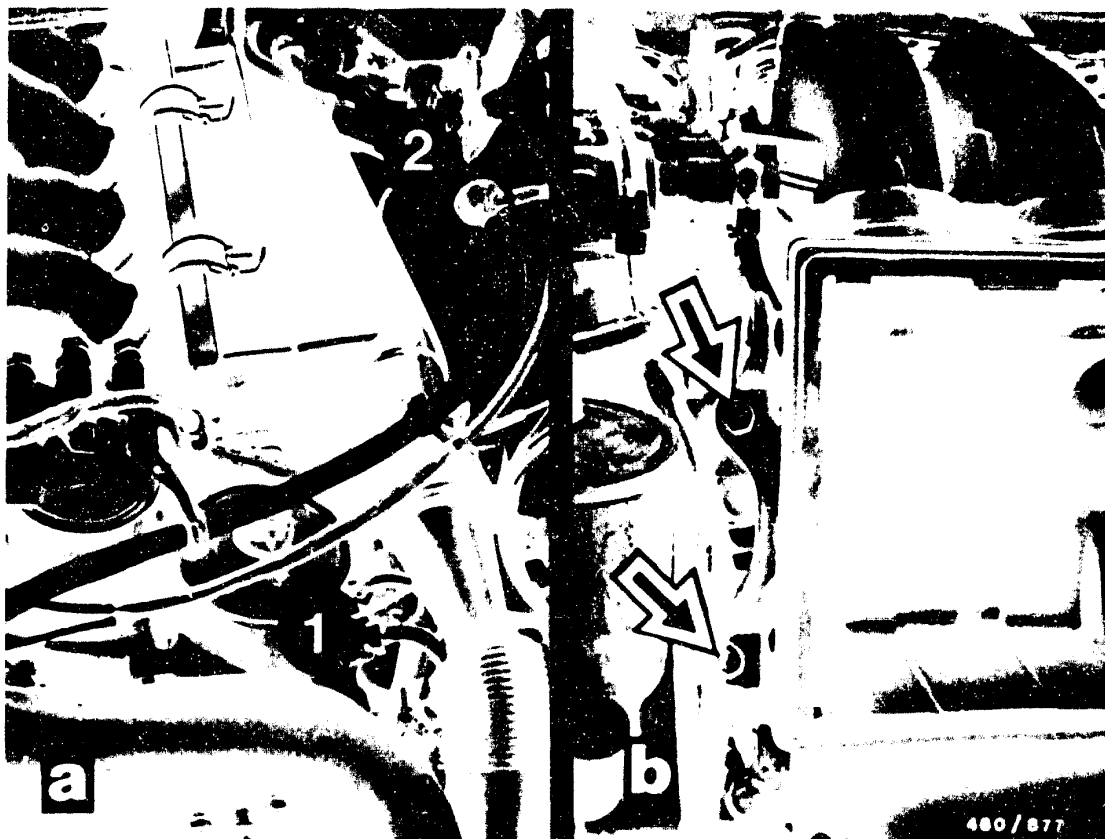
- 1 = Extension spring
- 2 = Tensioning roller
- 3 = Coolant pump

Unhook extension spring from tensioning roller.
Push back tensioning roller and take off ribbed V-belt.

F21

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





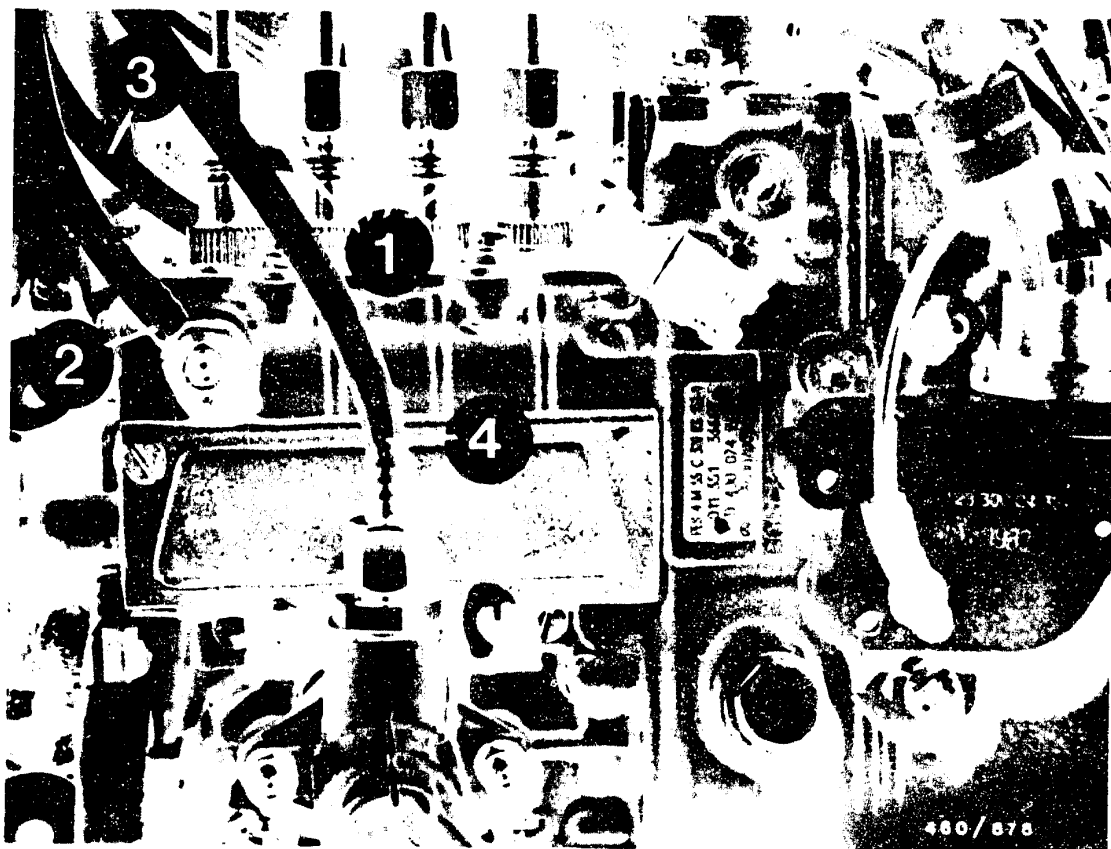
1 = Air-intake dome
2 = Air filter cover

Remove air-intake dome and air filter cover (loosen 6 fastening clamps).
Remove the fastening nuts of the side holders for air guide housing (see picture, arrows).

F22

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





- 1 = Injection lines
- 2 = Fuel inlet line
- 3 = Fuel return line
- 4 = Inlet line to fuel filter

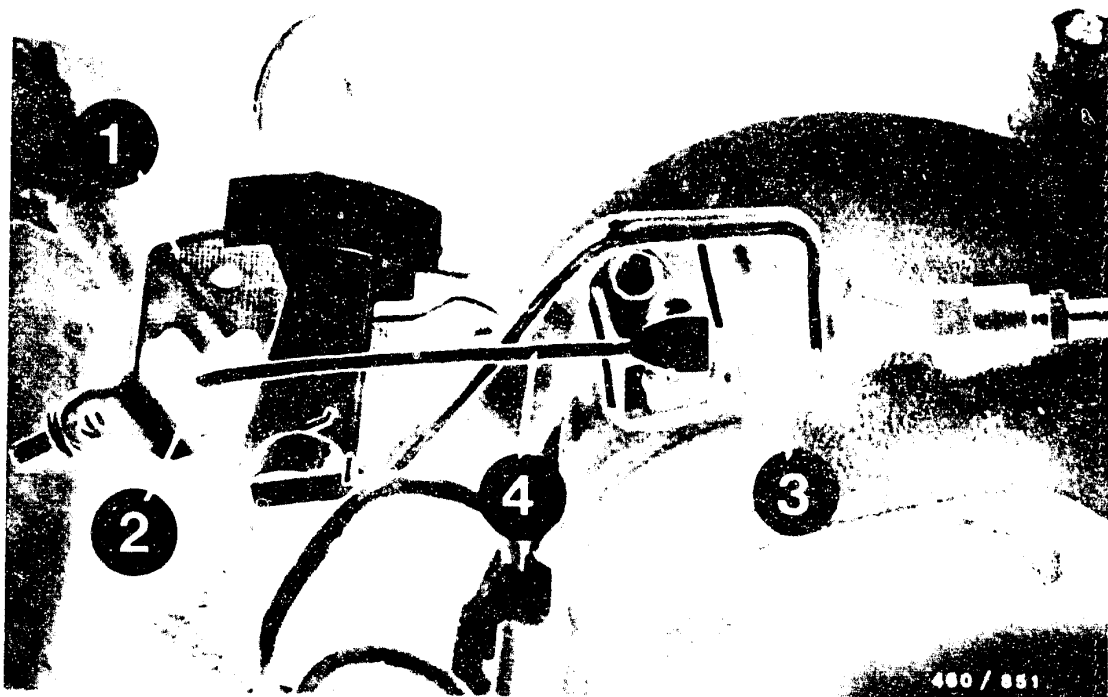
Loosen injection lines.

Unscrew fuel inlet line, fuel return line and inlet line to fuel filter.

F23

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





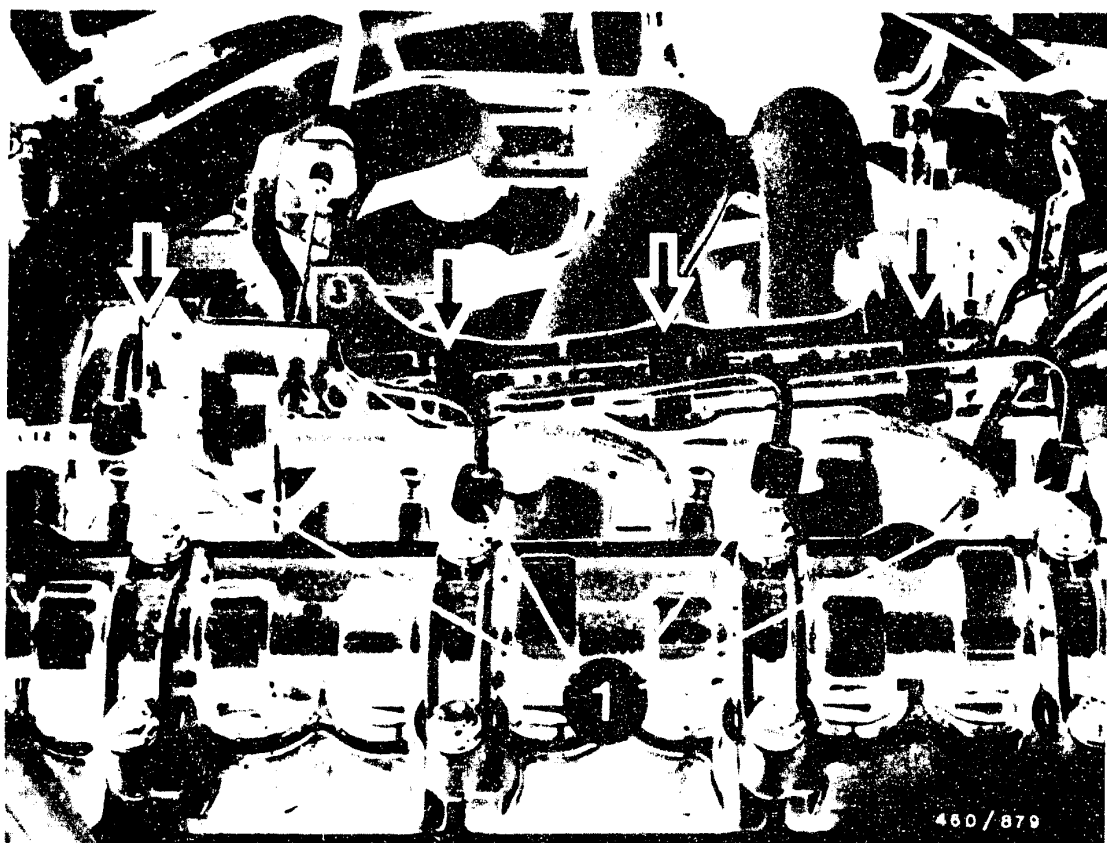
- 1 = Bell crank
- 2 = Guide piece
- 3 = Expansion clamp
- 4 = Cable

Press out slotted guide piece on bell crank.
Press together expansion clamp.
Unhook cable and place to one side.

F24

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





1 = Injection lines

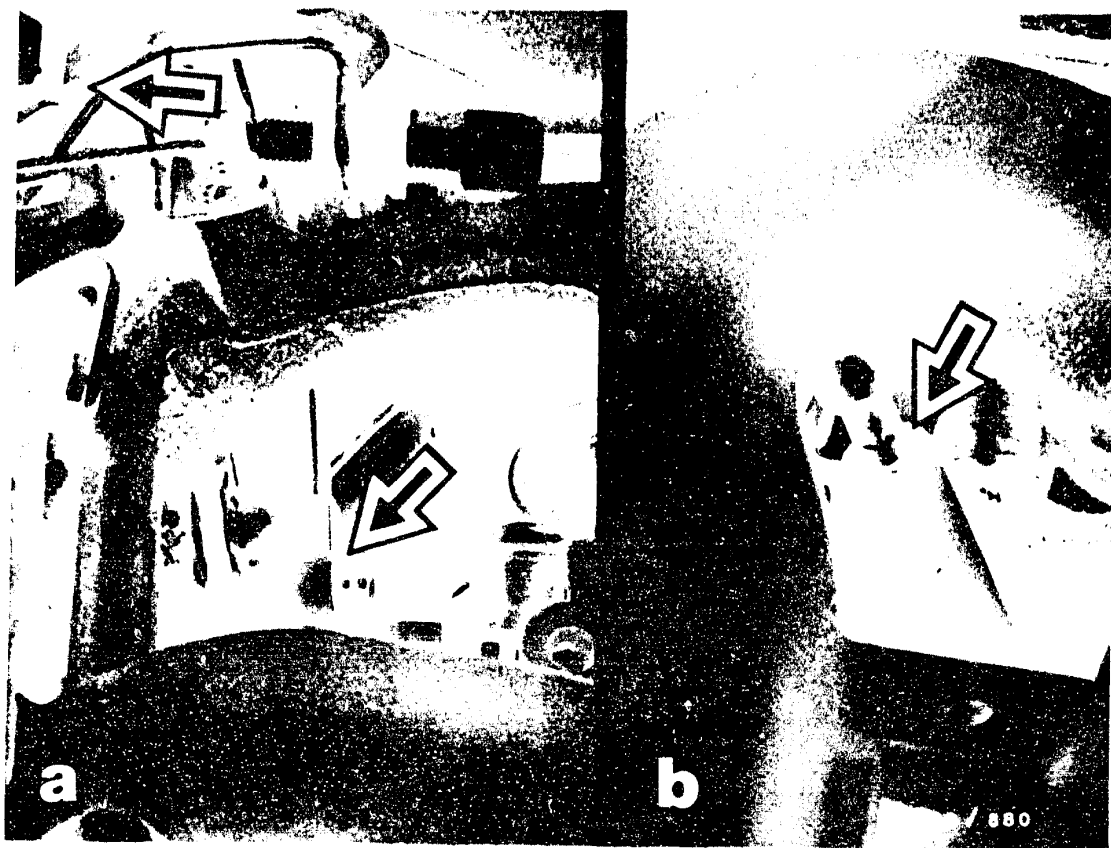
Unscrew injection lines from nozzle-holder assemblies.
Remove fastening screws of injection lines and plastic
clip (see picture, arrows).

G1

Remove fuel-injection pump

MB 200D, 250D, 300D (W 124)



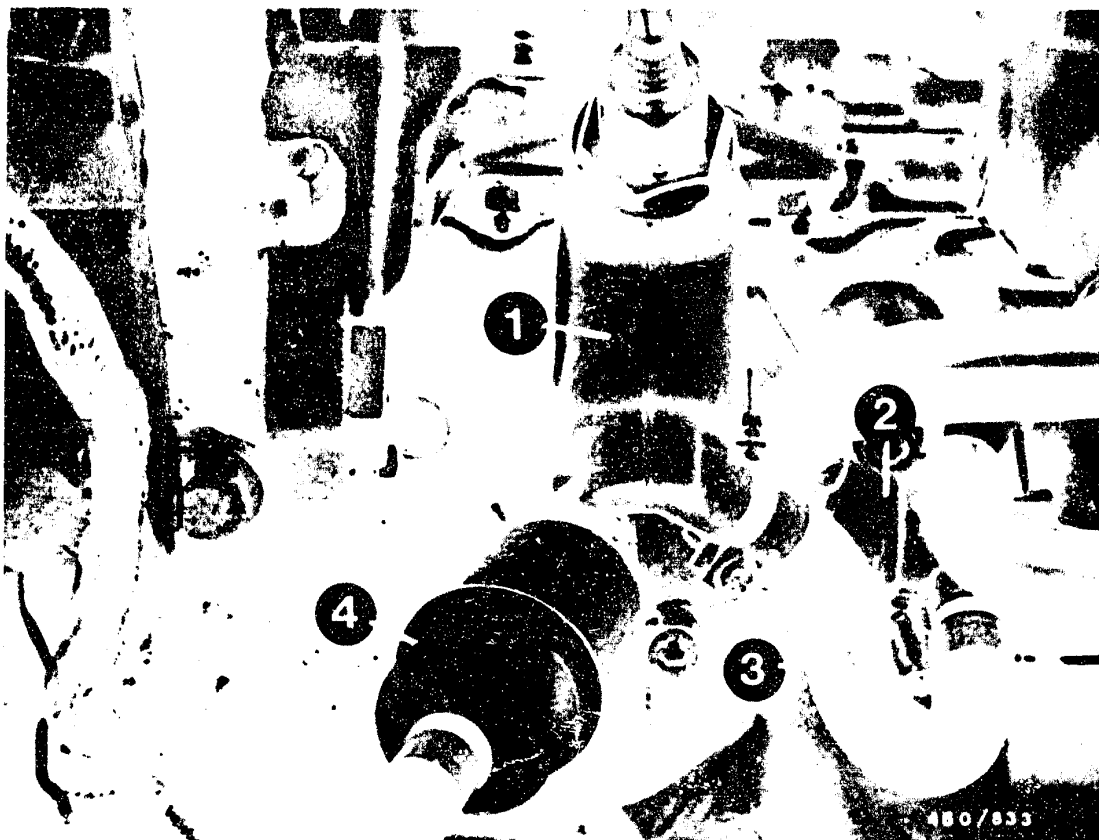


Unhook regulating linkage (arrows, picture a), damper (arrow, picture b).

G2

Remove fuel-injection pump
MB 200D, 250D, 300D (W 125)





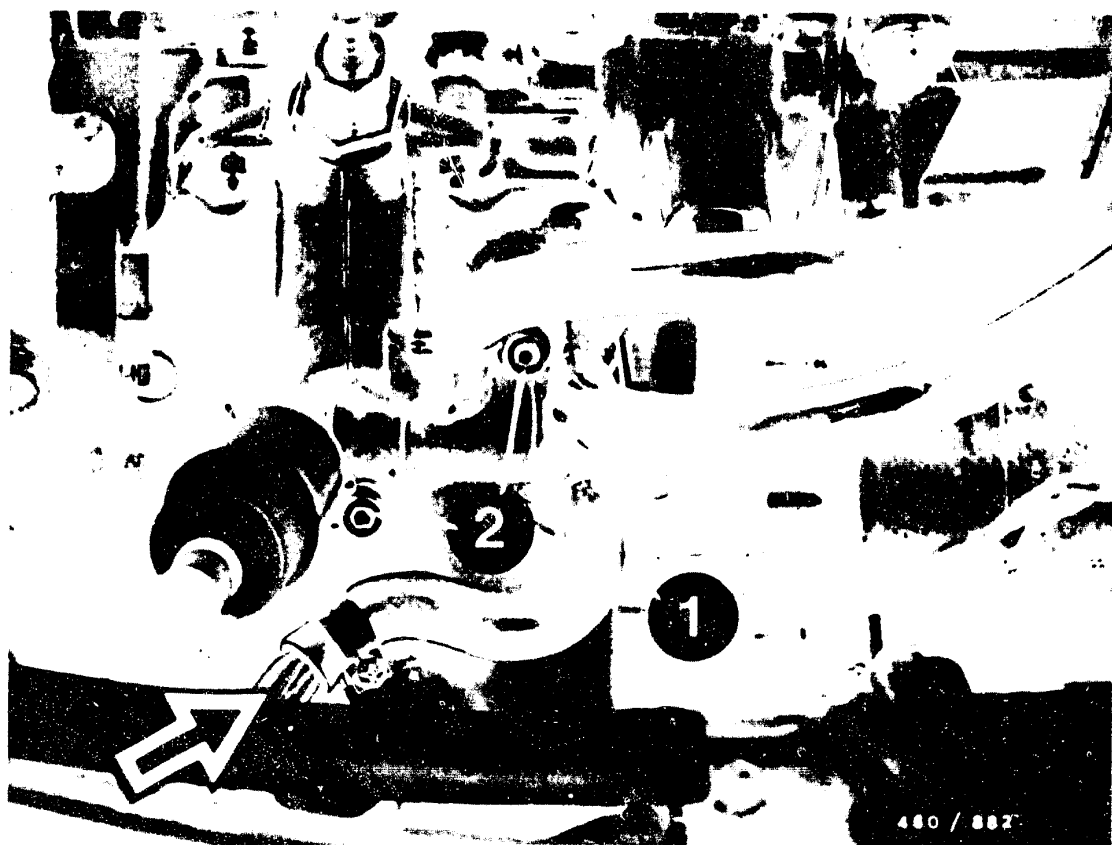
- 1 = Fuel supply pump
- 2 = Fuel thermostat
- 3 = Suction line
- 4 = Fuel prefilter

Unscrew suction line to fuel supply pump.

G3

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





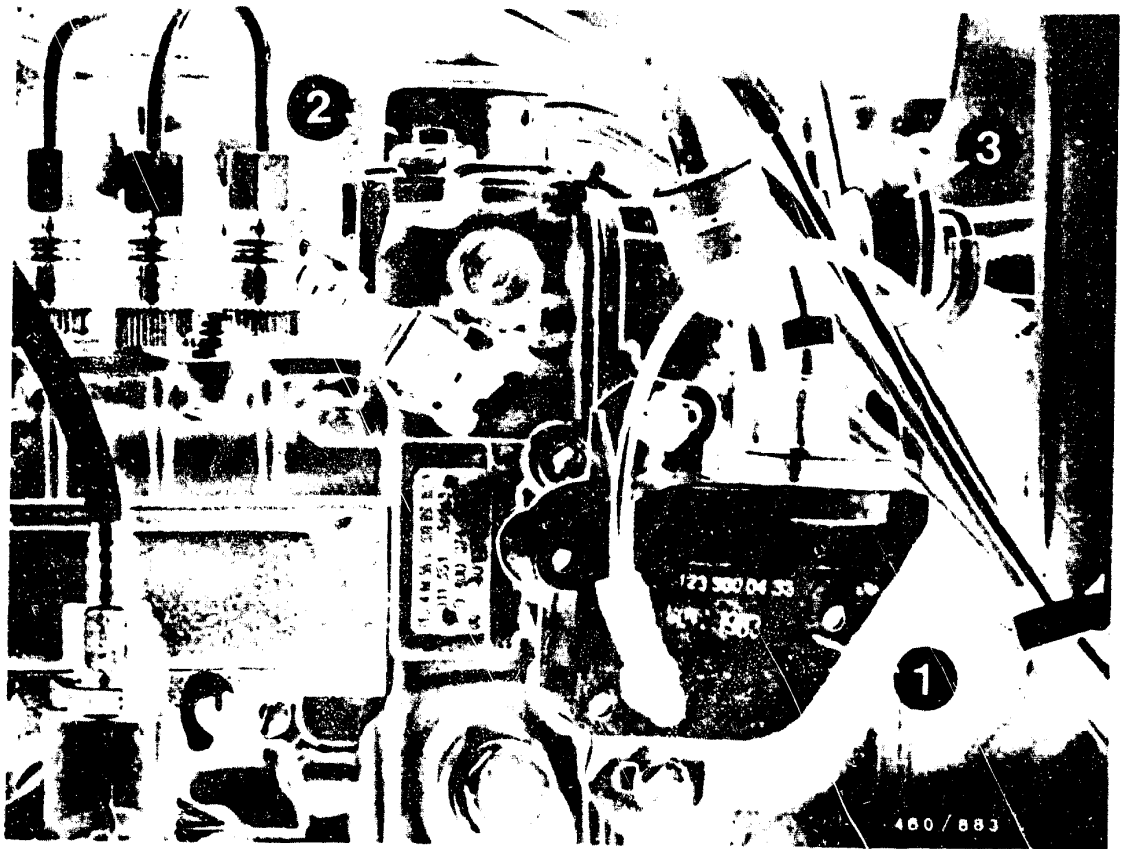
- 1 = Suction line
2 = Thermostat fastening screws

Close suction line with mandrel (arrow).
Unscrew fastening screws from fuel thermostat.

G4

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





- 1 = Vacuum-control valve
- 2 = Shutoff box
- 3 = Vacuum unit

Disconnect vacuum lines from vacuum unit for idle increase, from shutoff box and, on vehicles with automatic transmission, from vacuum-control valve.

G5

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)



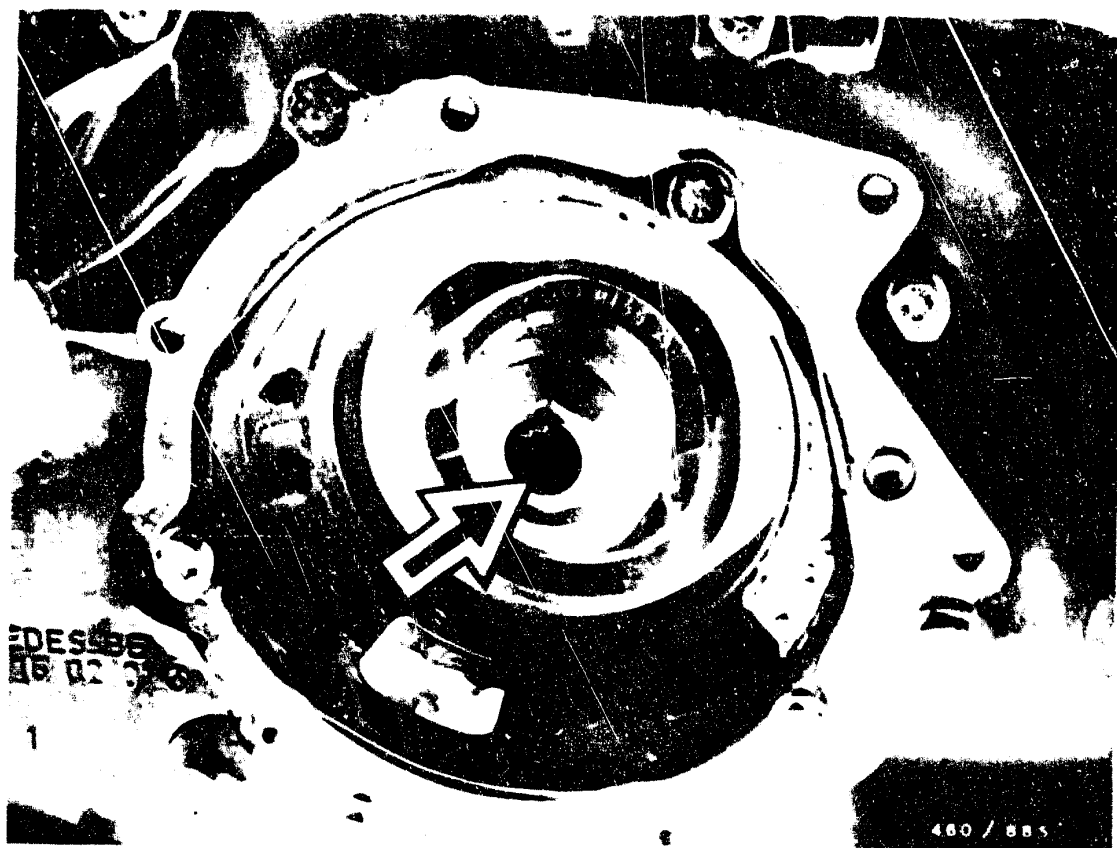


Remove vacuum pump fastening screws (see picture, arrows). Remove vacuum pump.

G6

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)



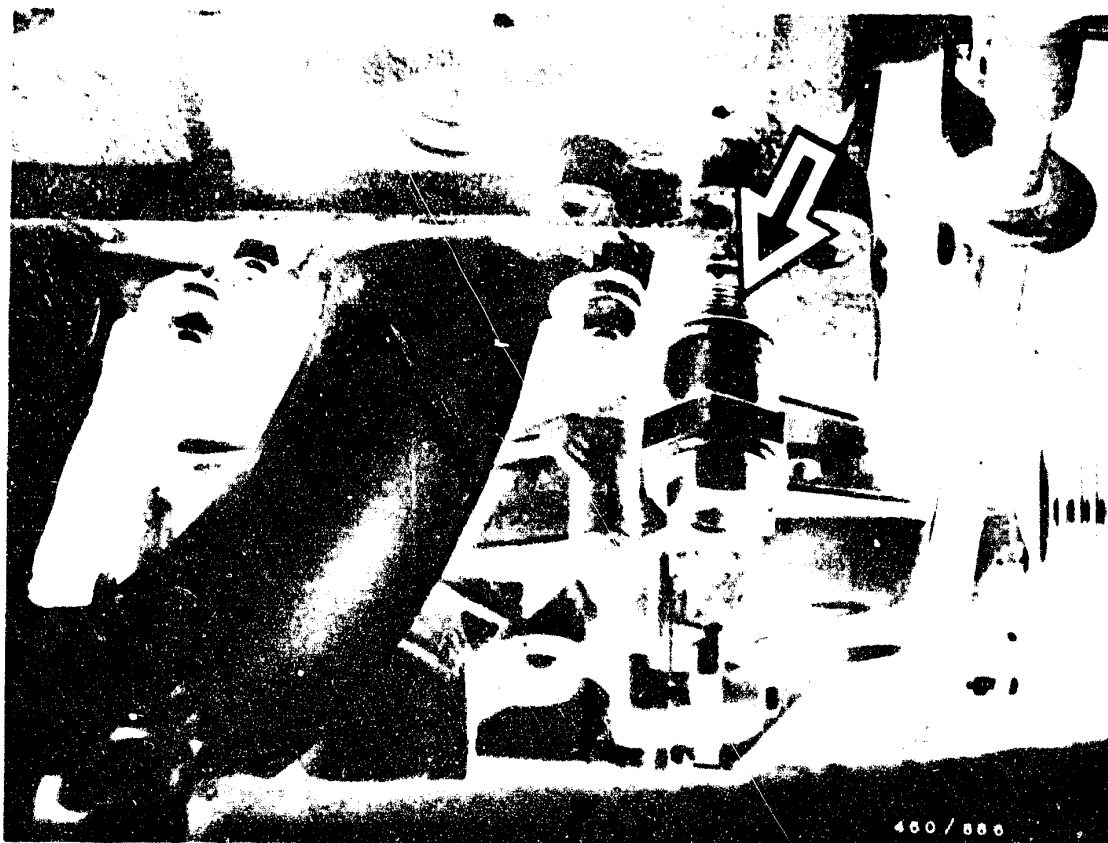


Only loosen central fastening screw of timing device
(see picture, arrow) (caution: LEFT-HAND THREAD)
To do this, hold the crankshaft to stop it from turning.

G7

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





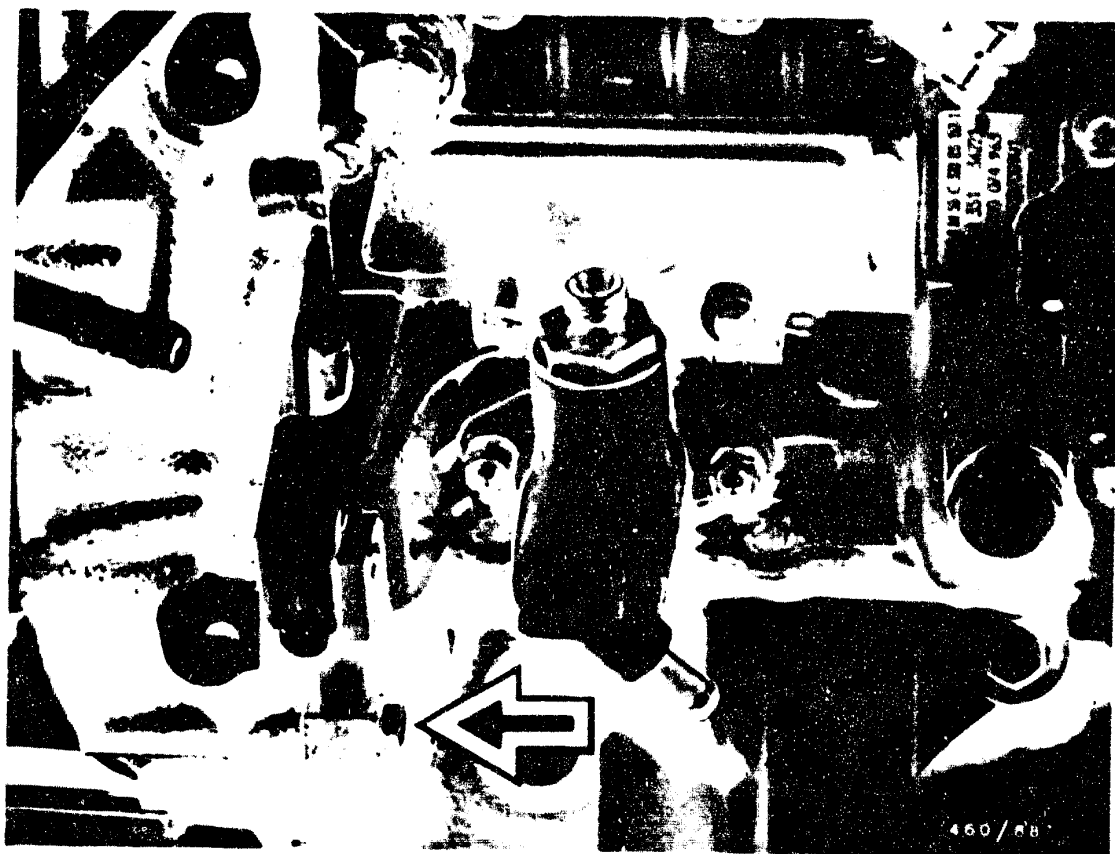
Loosen chain tensioner (see picture, arrow) (do not remove).

68

Remove fuel-injection pump

MB 200D, 250D, 300D (W 124)



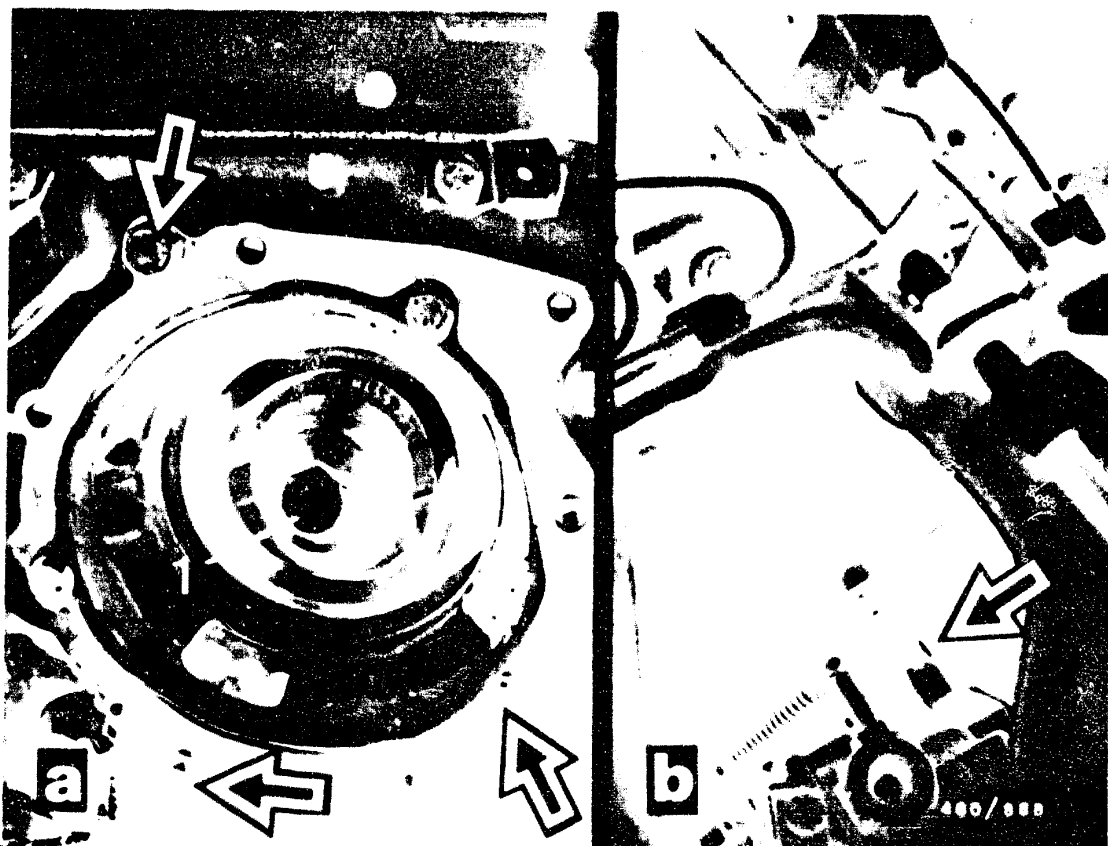


Only loosen setting device for setting the start of delivery (arrow). Do not remove fastening screw.

G9

Remove fuel-injection pump
MB 200D, 250D, 300D (W 124)





1 = Central fastening screws of timing device (left-hand thread)

Remove central fastening screw (left-hand thread).
Remove injection-pump fastening screws at drive end (arrows - picture a) and on support bracket (arrow, picture b).

Withdraw injection pump toward the rear.

Note:

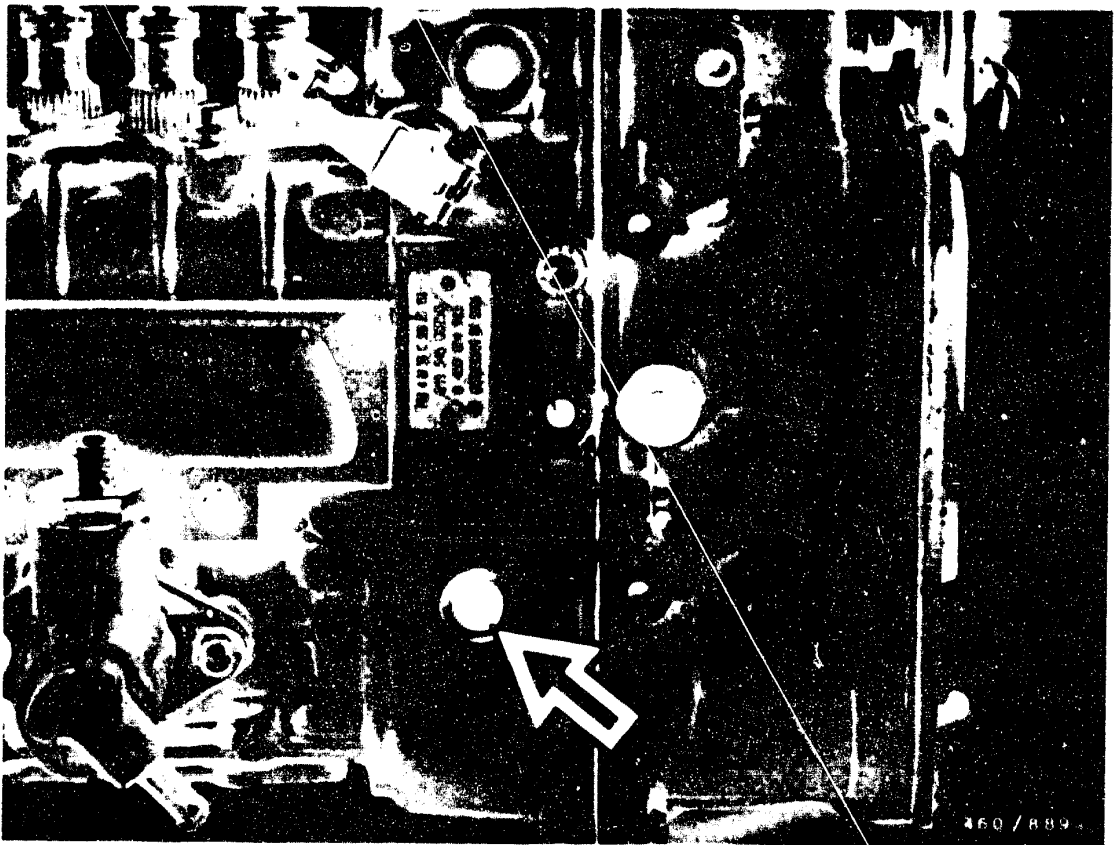
Do not change position of installed timing device.

G 10

Remove fuel-injection pump

MB 200D, 250D, 300D (W 124)



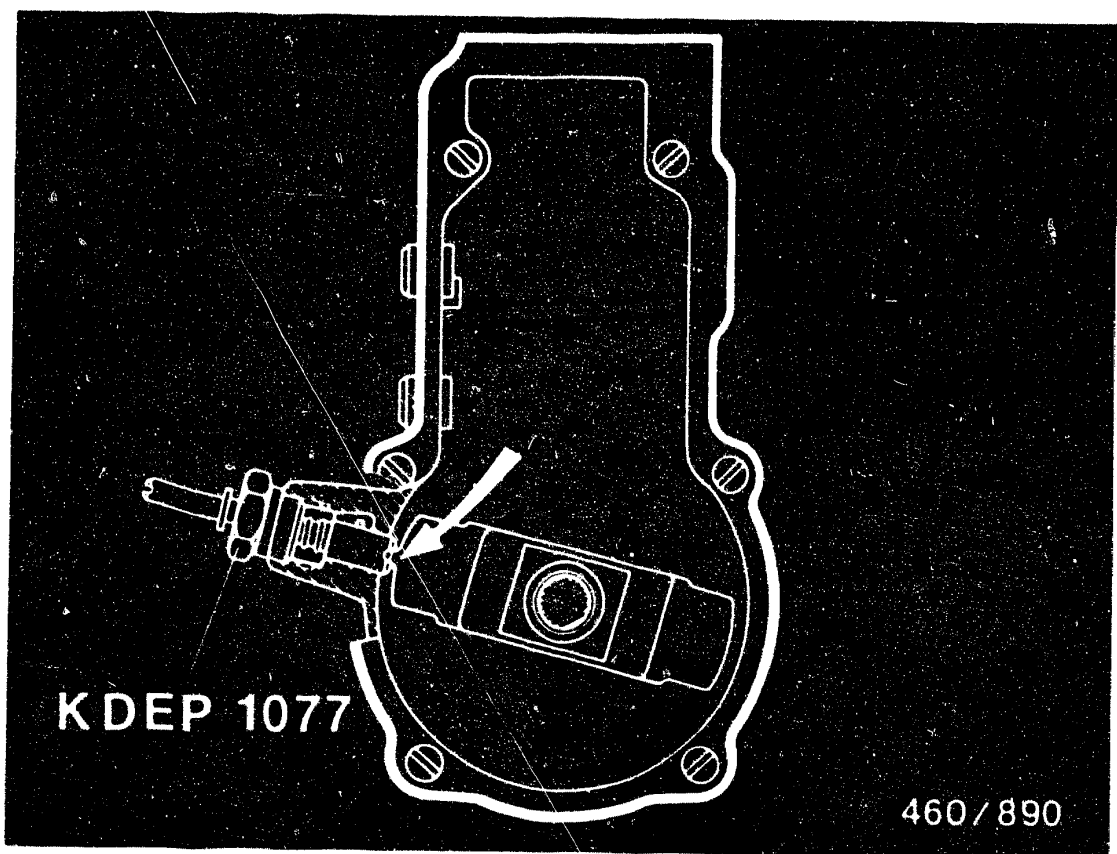


28. Install fuel-injection pump

28.1 Preparations

Remove screw plug (arrow) (already removed in picture).
Do not yet introduce injection pump into engine.





Turn injection-pump camshaft with drive coupling until the lug (see picture, arrow) of the governor is visible at the bore.

In this position, insert holding device KDEP 1077 until it can be felt to latch.

Tighten nut by hand.

Note:

Danger of damage to injection pump.

Immediately after installing the injection pump, remove holding device KDEP 1077.



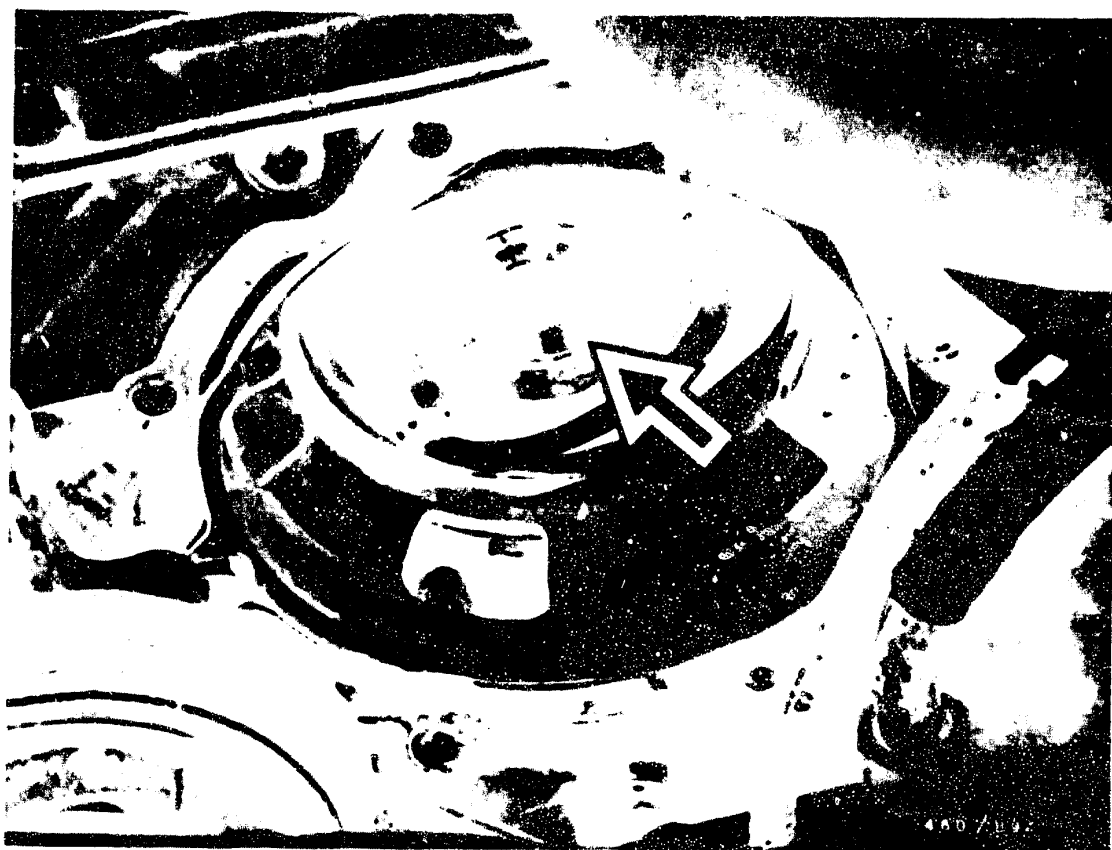


Before installing the injection pump, check whether the O-ring is fitted onto injection-pump flange (see picture, arrow).

G13

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)



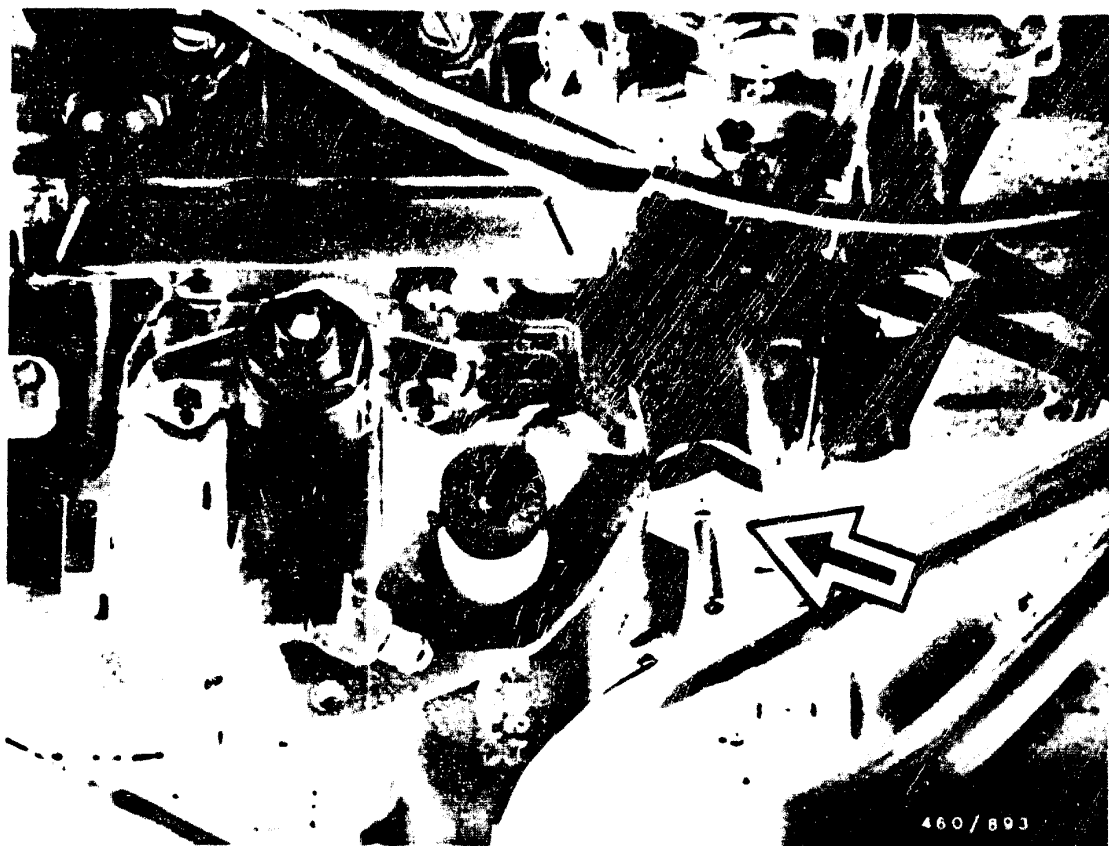


When installing the injection pump, make sure that the timing device (see picture, arrow) is not changed in its position.

G14

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





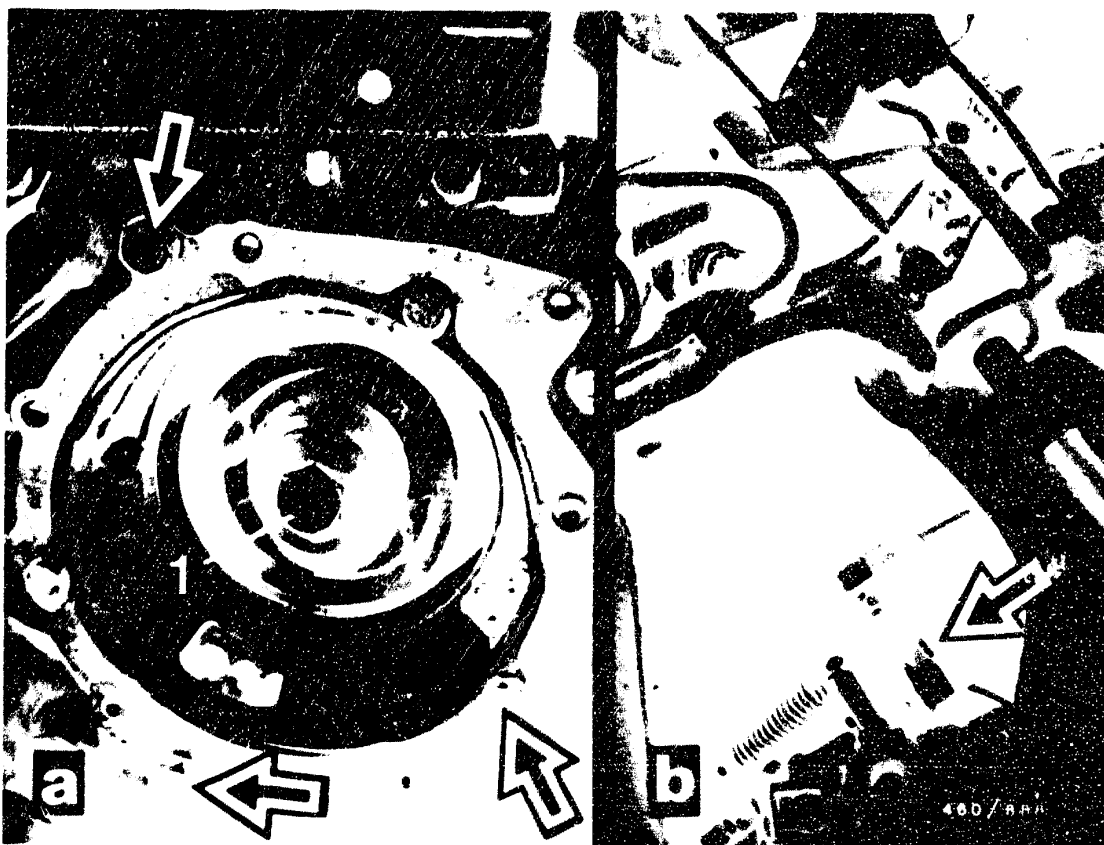
460/893

Introduce injection pump with holding device KDEP 1077 (see picture, arrow) into engine block so that injection-pump fastening screws are in the centre of the slots (this makes it possible to turn to both sides for fine adjustment).

G 15

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





1 = Central fastening screw on timing device (left-hand thread)

Finger-tighten fastening screws at drive end (picture a) and on support bracket (arrow, picture b).

Remove holding device KDEP 1077.

Mount screw plug with seal (Daimler Benz service part).

Insert central fastening screw (picture a) and tighten to 40 - 50 Nm. Caution: LEFT-HAND THREAD.

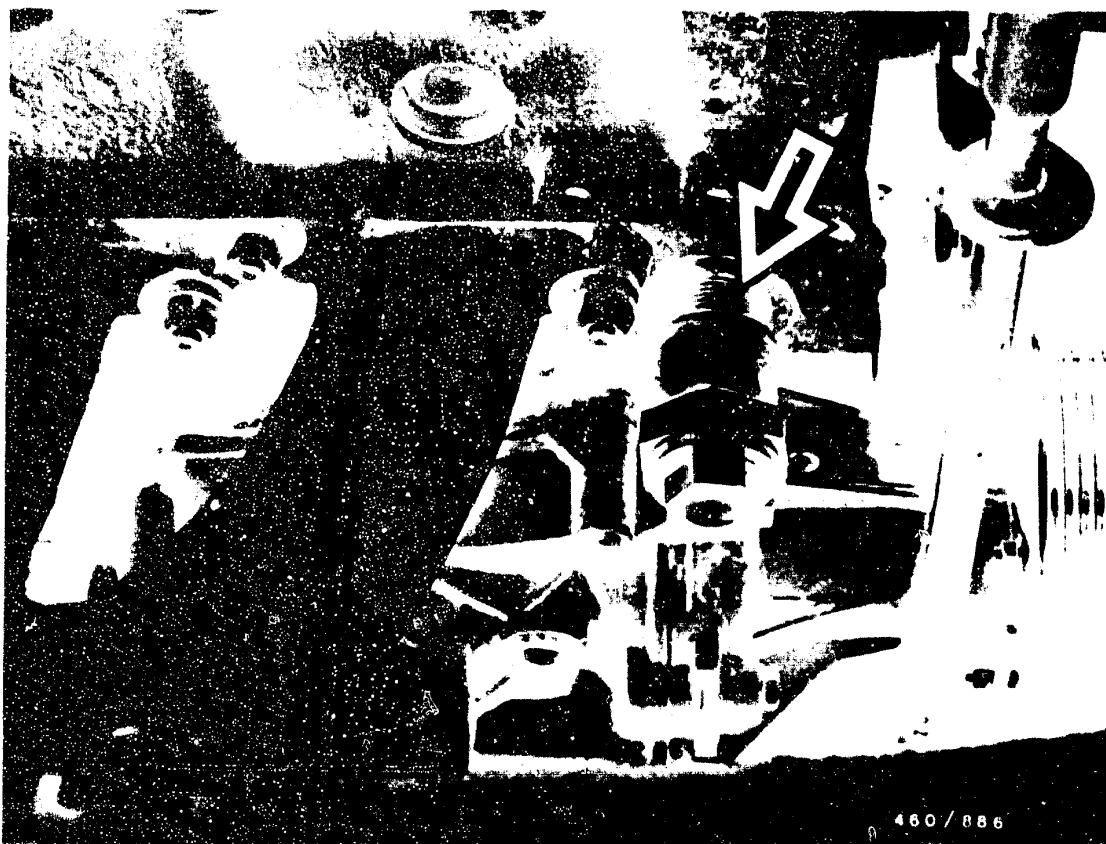
Hold crankshaft so that it cannot turn.

G 16

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)



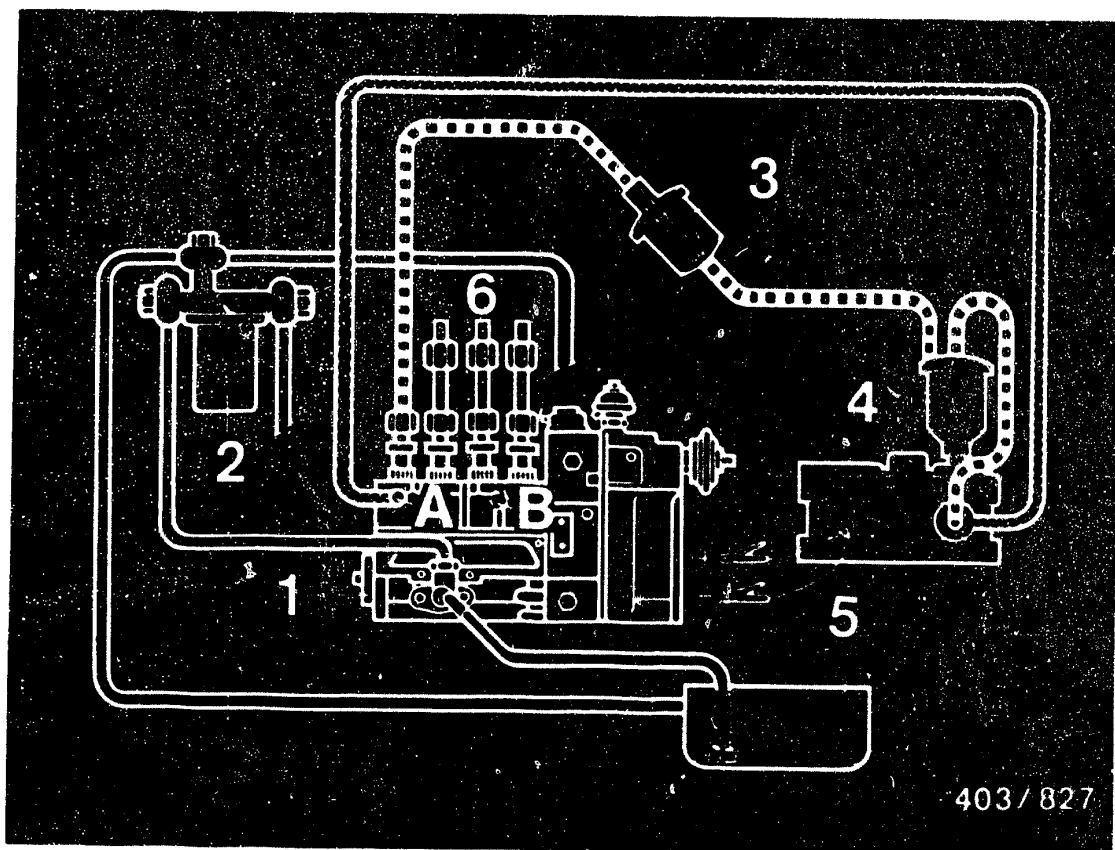


Screw in chain tensioner (see picture, arrow) and tighten to a torque of 80 Nm.

G17

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





 Return line

 High pressure approx. 30 + 4 bar

- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.

Connection diagram for setting the start of delivery (static)

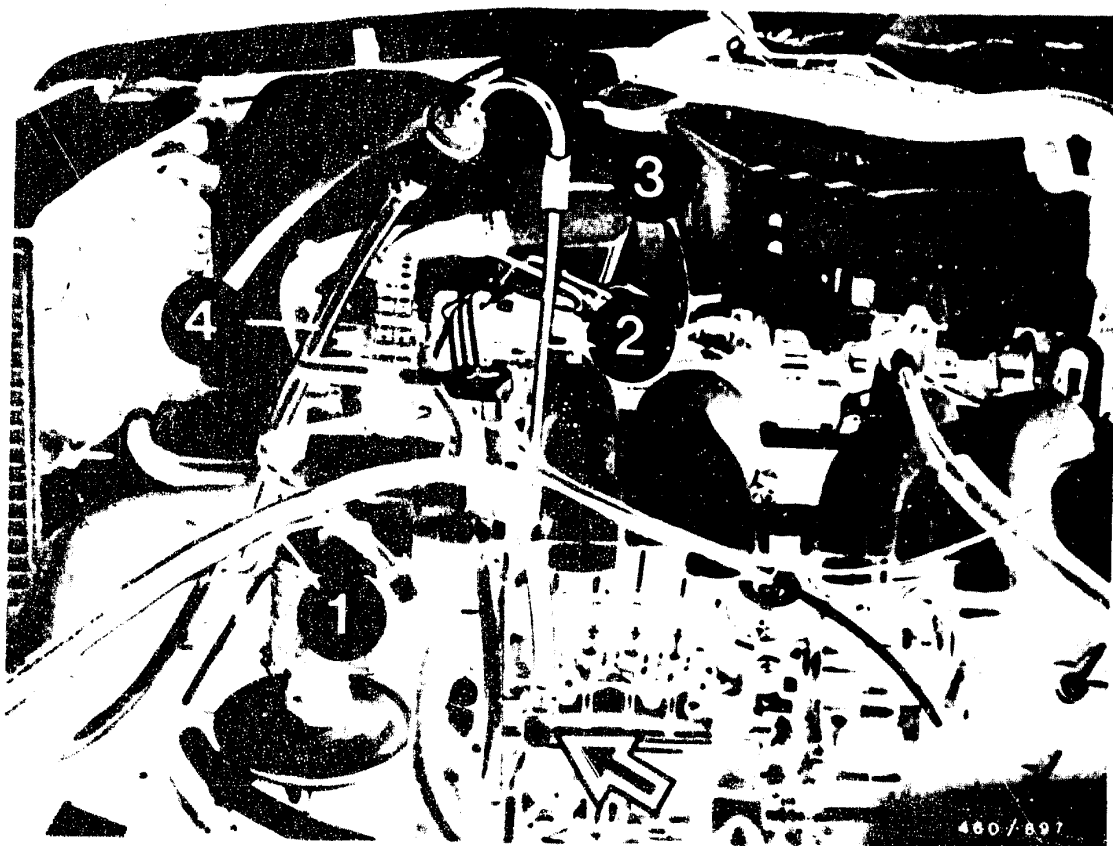
High-pressure overflow method

Valid for 4-, 5-, and 6-cylinder pumps (only 4-cylinder pump in picture).

G 18

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





- 1 = High-pressure hose
- 2 = Test line
- 3 = Pipe bend
- 4 = Return hose

Setting the start of delivery

Place start-of-delivery setting device next to vehicle (e.g. on workshop trolley).

Connect high-pressure hose of device to suction chamber inlet of injection pump (see picture, arrow).

Seal return connection of pump by means of screw plug.

Secure test line KDEP-P 200/11 to delivery-valve holder of cyl. 1 (for start-of-delivery setting) and connect pipe bend. Hang return hose into fuel tank of start-of-delivery setting device.



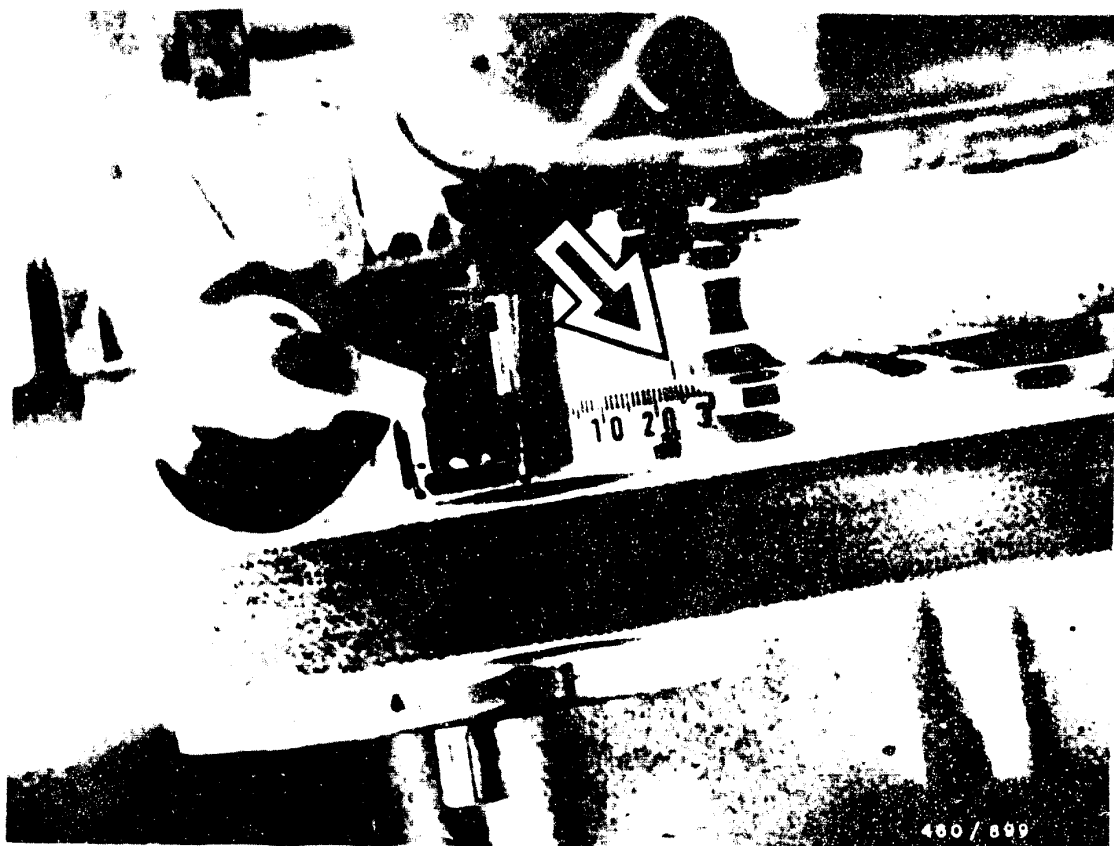


Seal the remaining pump outlets with pressure-limiting valves KDEP-P 200/13 (see picture, arrows). Connect electric leads of start-of-delivery setting device to vehicle battery (12 V) (red cable to +). Fill fuel tank of start-of-delivery setting device with diesel fuel.

G20

Install fuel-injection pump
NB 200D, 250D, 300D (W 124)





Turn crankshaft over twice in engine direction of rotation and set to approx. $+35^{\circ}$ BTDC on compression stroke of cylinder 1 (valve overlap on cylinder 4). Press injection-pump control rod to full load. Switch on start-of-delivery setting device.

Note:

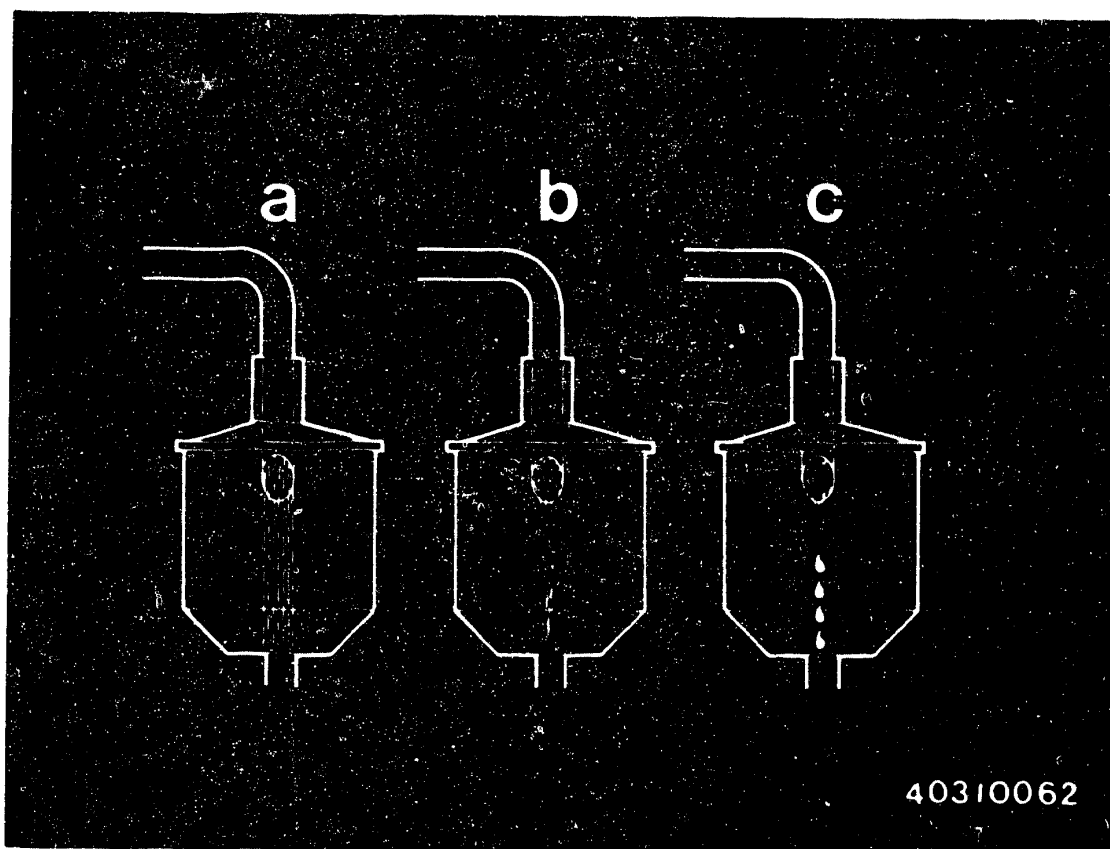
Switch on start-of-delivery setting device only for measuring. If injection nozzles are leaking, it is otherwise possible for fuel to enter the combustion chamber.

G21

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)





40310062

a = Full fuel jet

b = Tapered fuel jet just before start of delivery

c = Chain of drips - start of delivery

Slowly continue to turn crankshaft in direction of rotation of engine.

While doing this, observe fuel jet in sight glass.

When the jet turns into a chain of drips, the start of delivery has been reached.

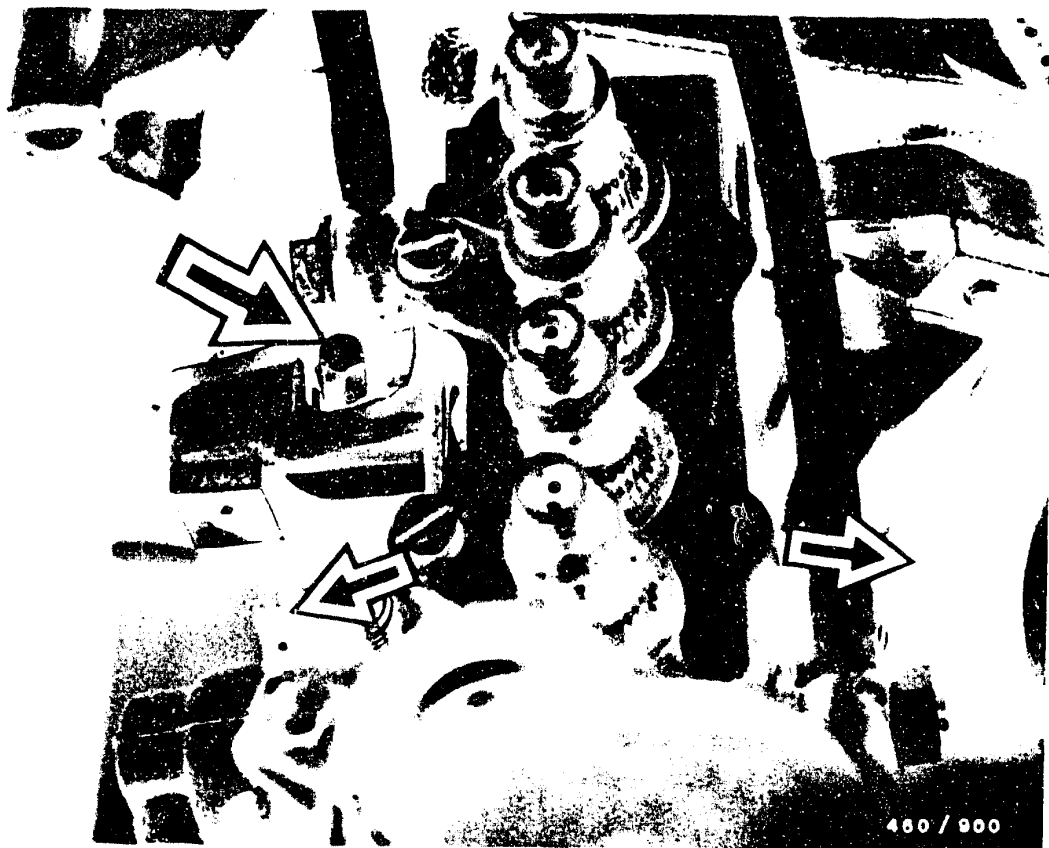
Set value 24° BTDC.

G22

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)



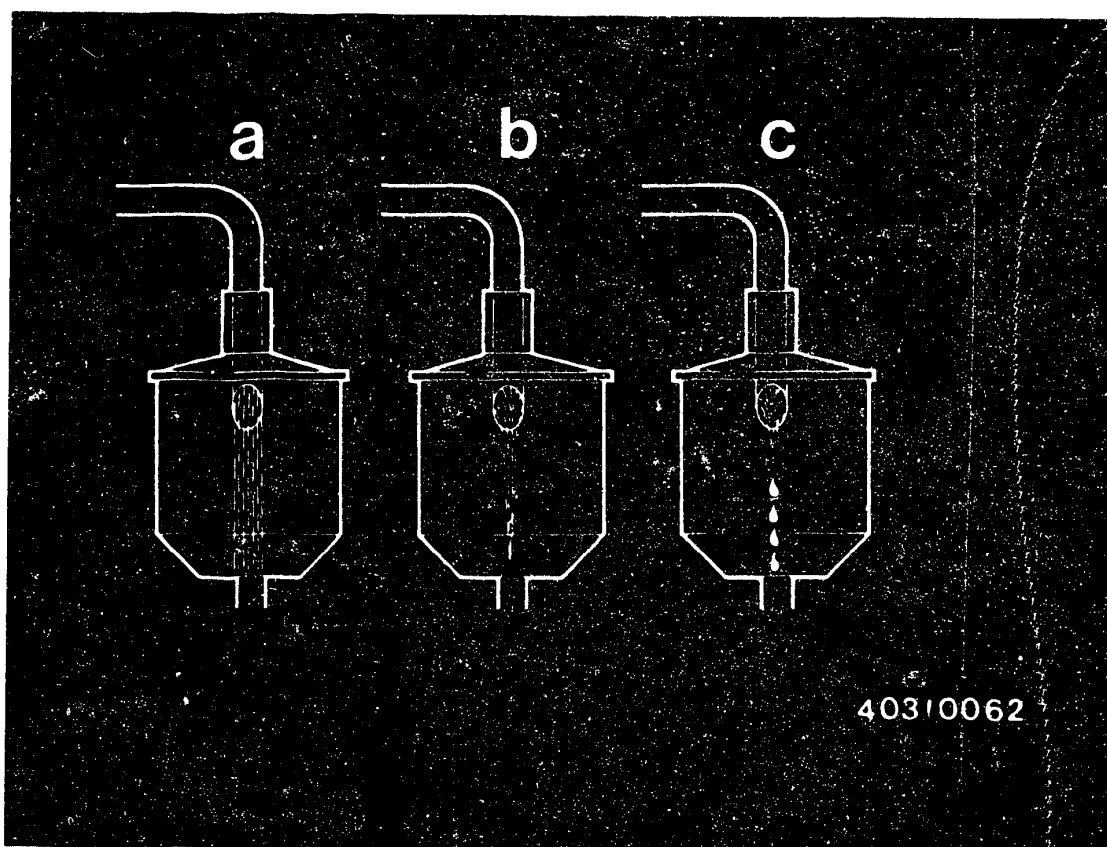


If set value is not reached, pivot injection pump by turning the adjusting screw (see picture, arrow).
Turning the adjusting screw to the right = start of delivery comes later
Turning the adjusting screw to the left = start of delivery comes earlier.
If the range of adjustment is not enough, the injection pump must be relocated.
Then test the start of delivery again.

G23

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





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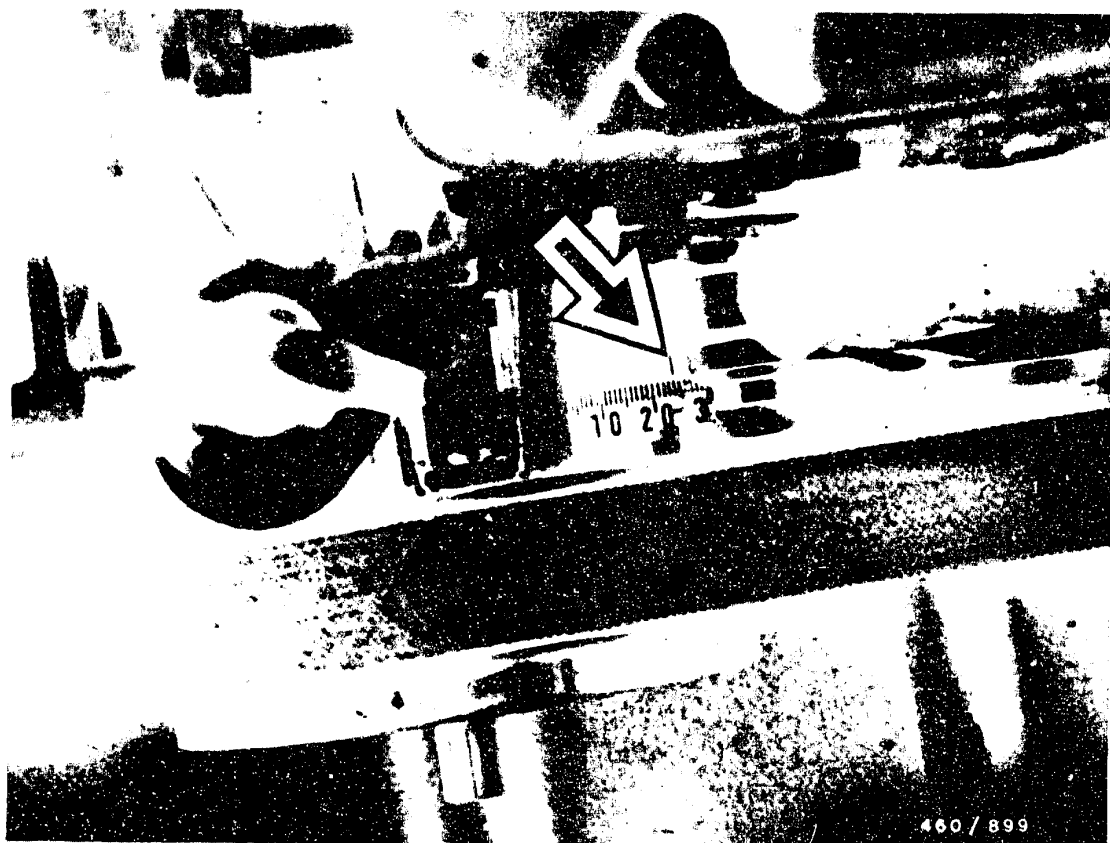
- a = Full fuel jet
- b = Tapered fuel jet just before start of delivery
- c = Chain of drips - start of delivery

Turn engine over in direction of rotation to just before start of delivery (approx. 35° BTDC).
 Switch on start-of-delivery setting device. Press injection-pump control rod to full load.
 Turn engine further in direction of rotation. While doing this, observe fuel jet in sight glass. The start of delivery has been reached when the fuel jet changes into a chain of drips.

G24

Install fuel-injection pump
 MB 200D, 250D, 300D (W 124)





In this position the engine marks for start of delivery must align (see picture).

Set value: 24° BTDC

Switch off start-of-delivery setting device and remove accessories.

Remove screw plug from injection-pump return.

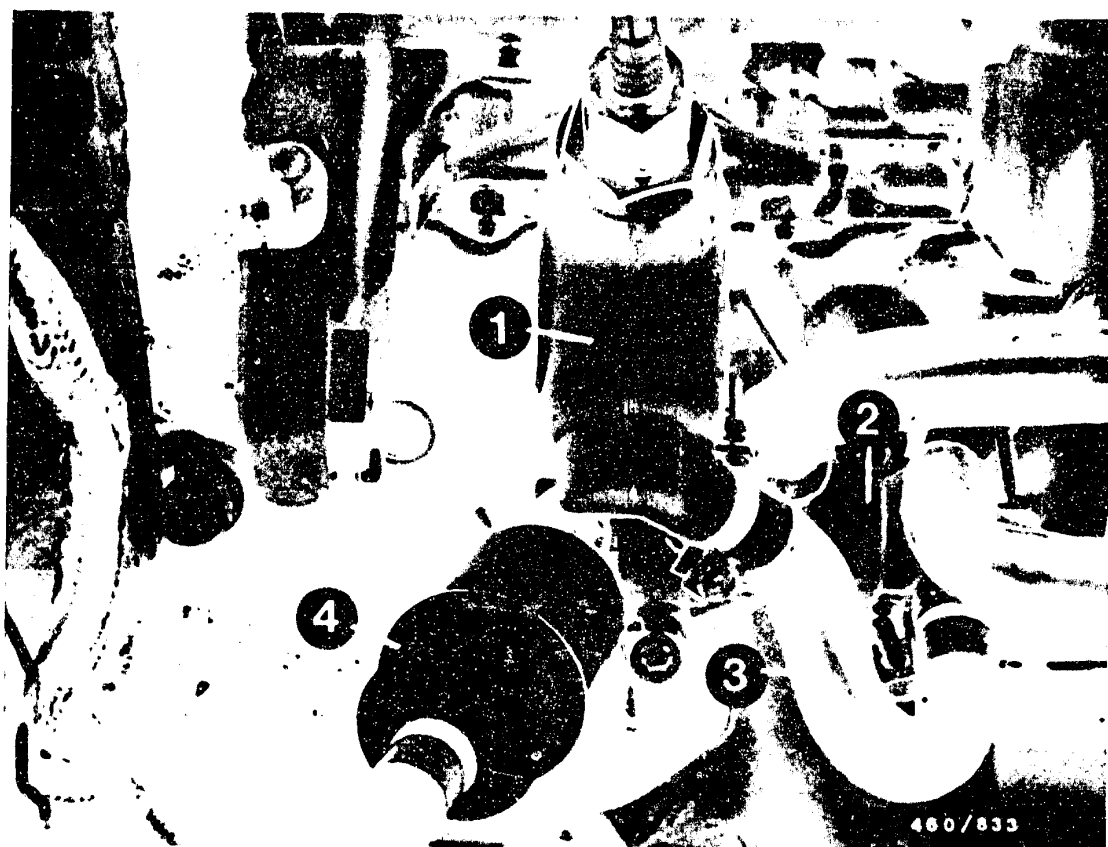
Tighten injection-pump fastening screw (20 - 25 Nm).

H1

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)





- 1 = Fuel supply pump
- 2 = Fuel thermostat
- 3 = Suction line
- 4 = Fuel prefilter

Mount fuel thermostat.

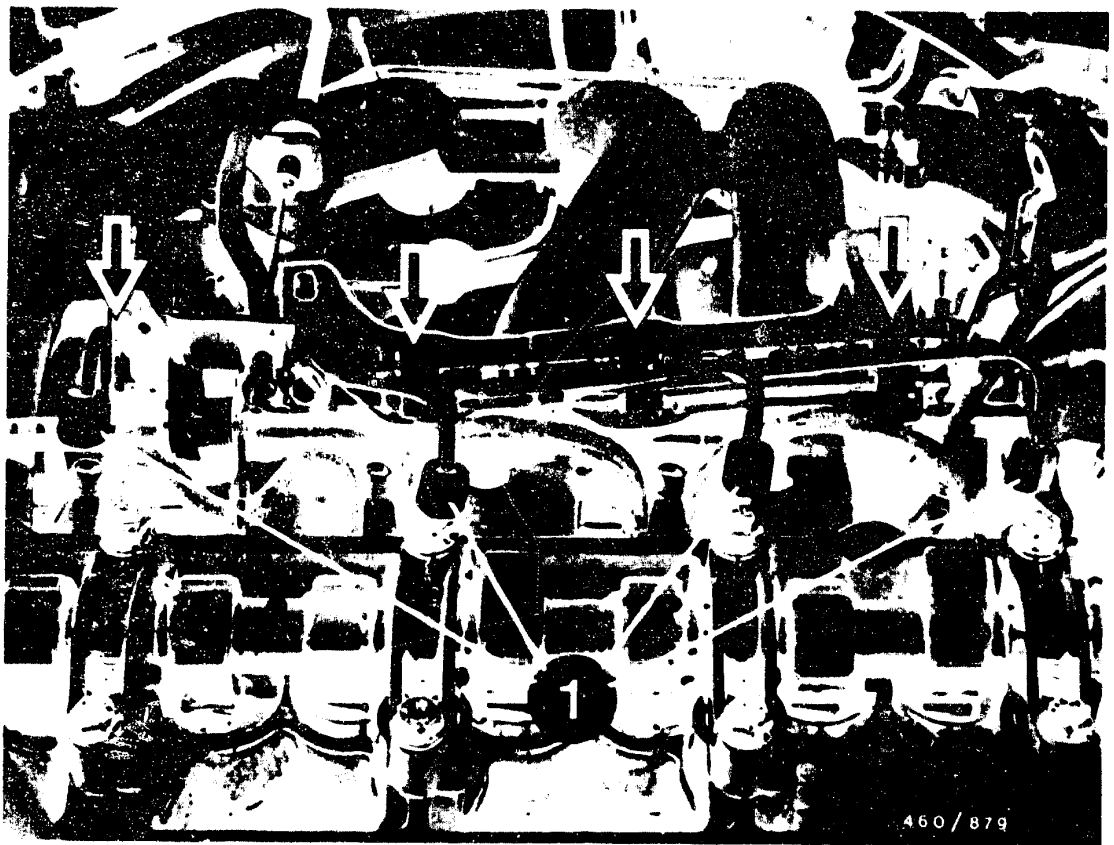
Mount suction line on fuel supply pump.

H2

Install fuel-injection pump .

MB 200D, 250D, 300D (W 124)





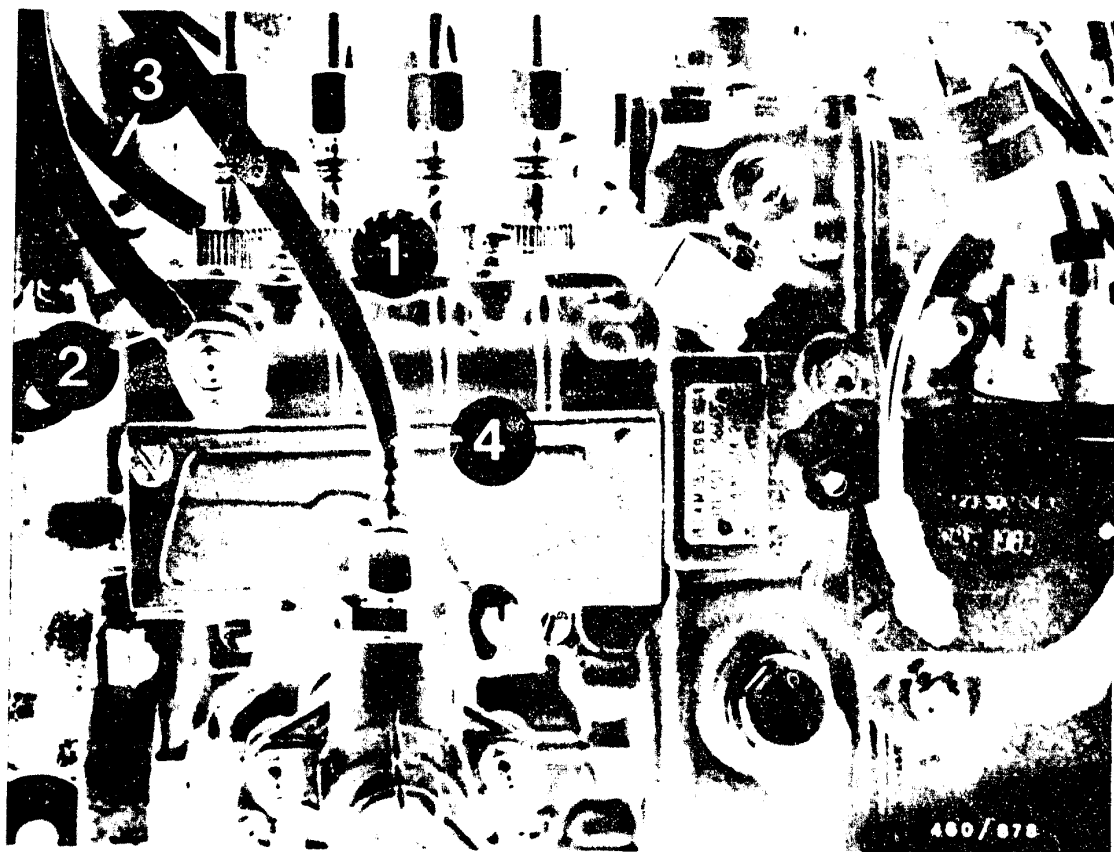
1 = Injection lines

Mount injection lines on nozzle-holder assemblies.
Mount fastening screws and fuel clip (see picture,
arrows).

H3

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





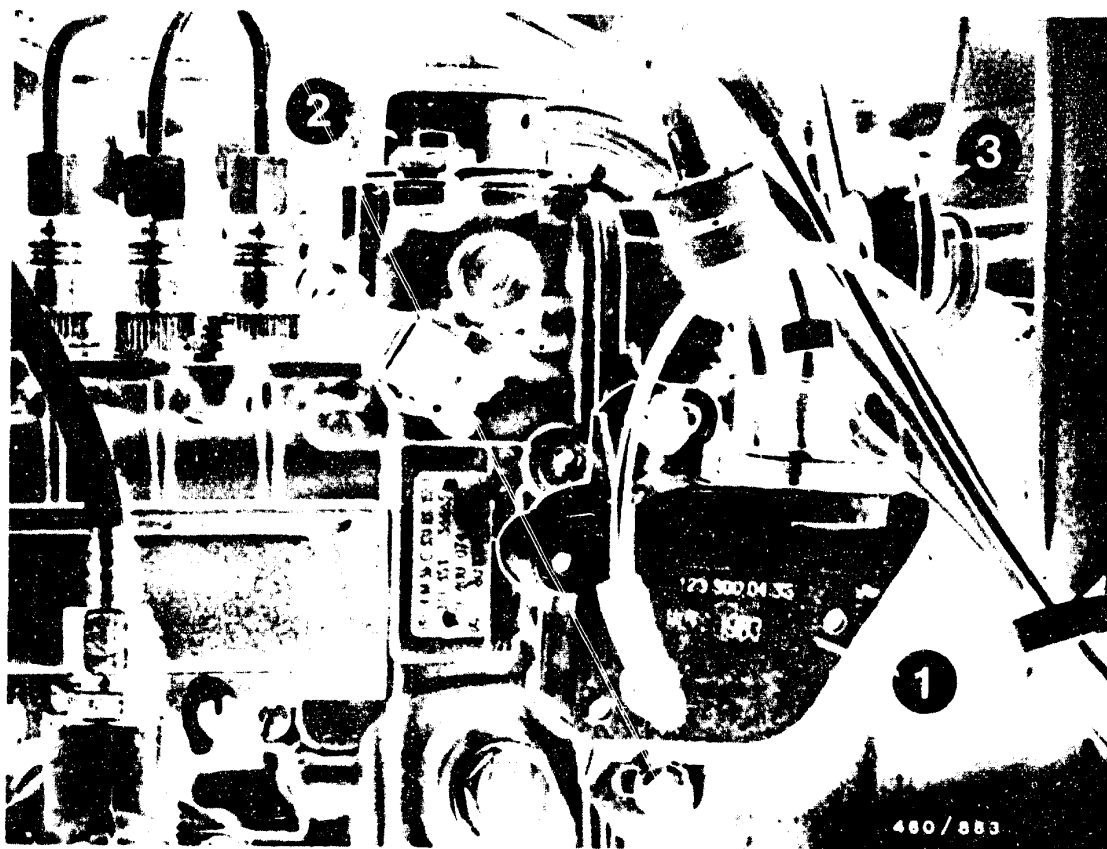
- 1 = Injection lines
- 2 = Fuel inlet line
- 3 = Fuel return line
- 4 = Inlet line to fuel filter

Connect injection lines to injection pump.
Mount fuel inlet line, fuel return line and inlet line
to fuel filter.

H4

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





- 1 = Vacuum unit
- 2 = Shutoff box
- 3 = Vacuum control valve

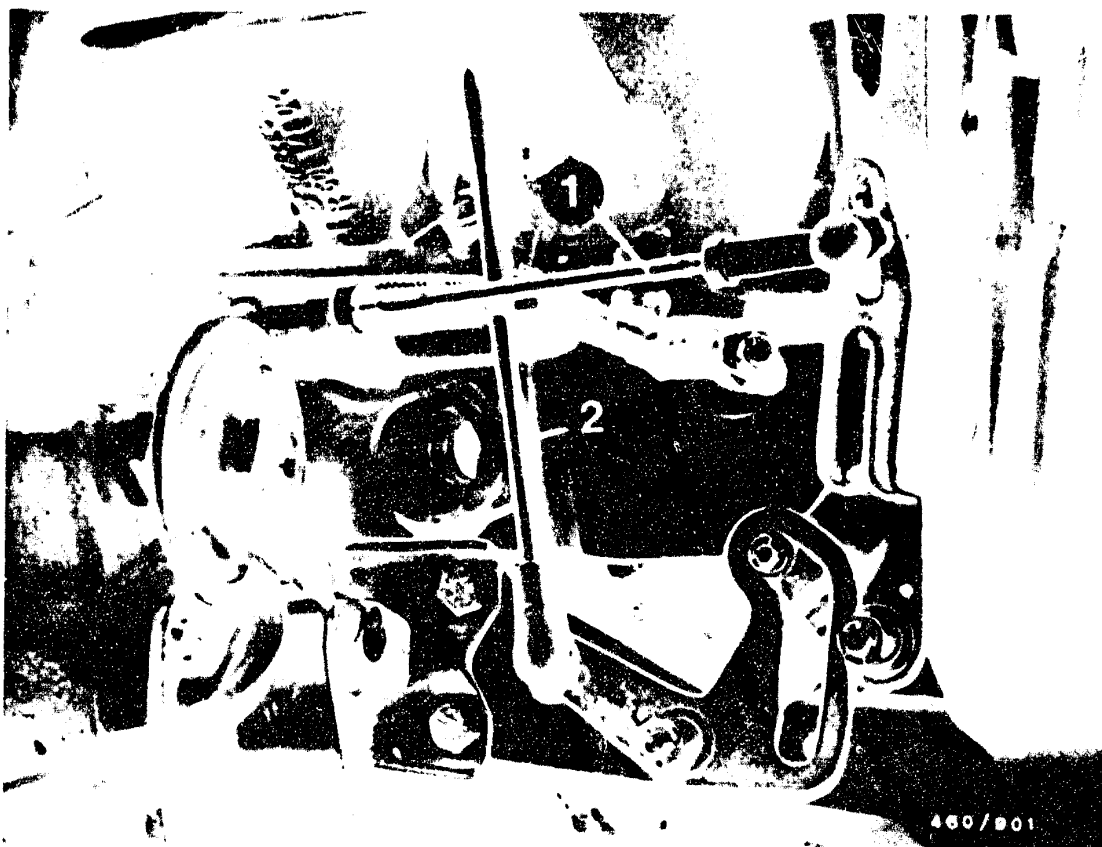
Mount vacuum lines on vacuum unit for idle increase, on shutoff box and, on vehicles with automatic transmission, on vacuum control valve.

H5

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)





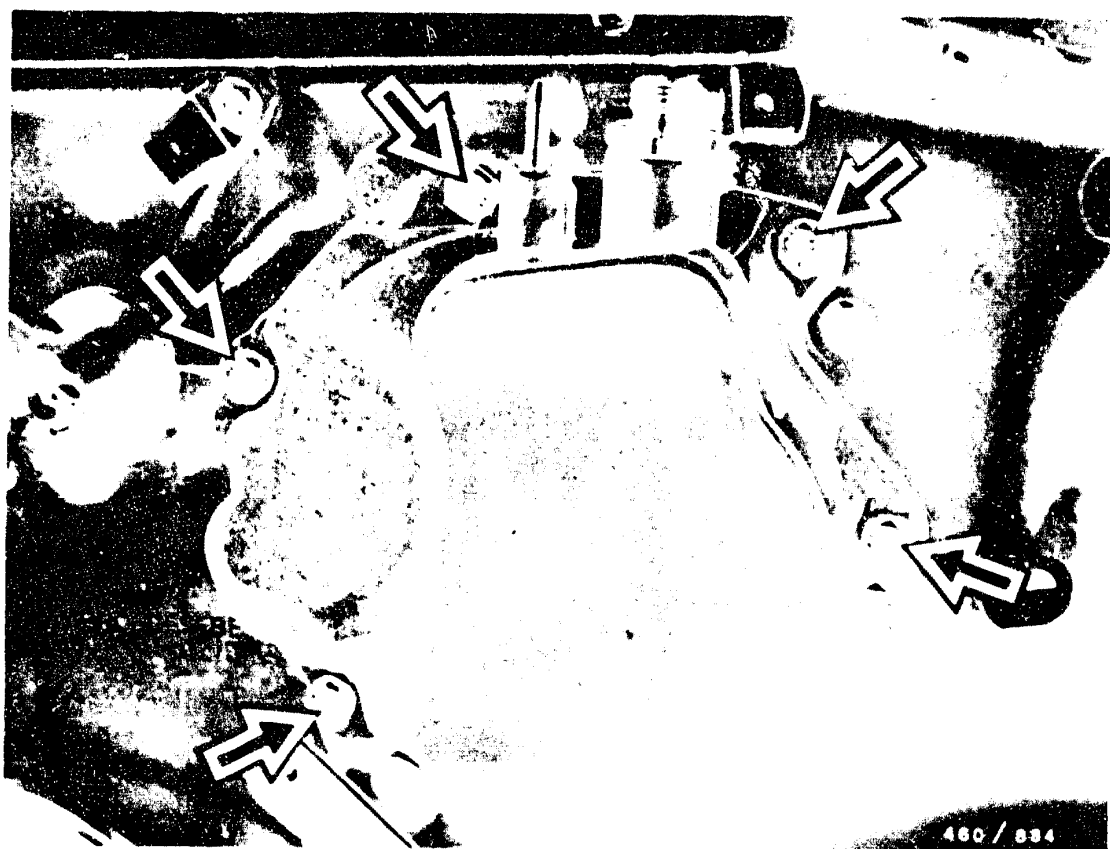
- 1 = Connecting rod to injection pump
2 = Connecting rod to regulating lever

Hook connecting rod into injection-pump control lever.
Hook connecting rod into regulating lever.

H6

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)



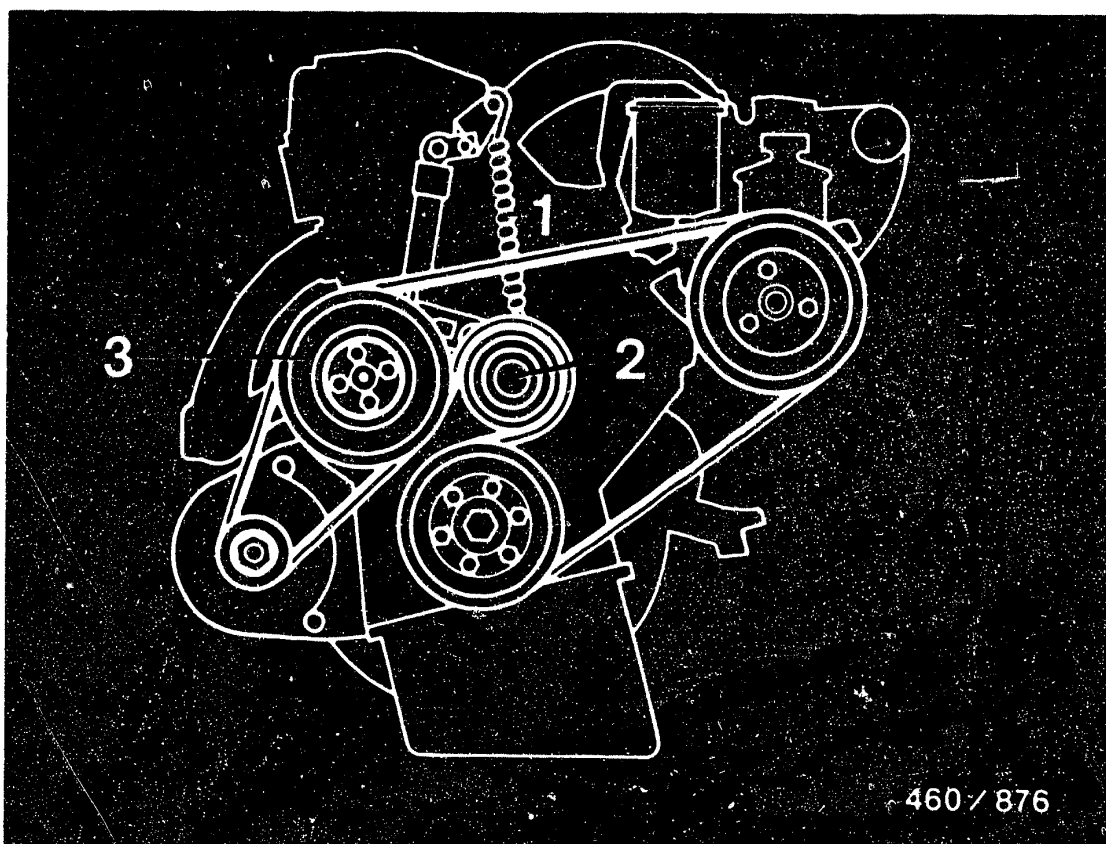


Mount vacuum pump.
Tighten fastening screws (see picture, arrows).

H7

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





460 / 876

- 1 = Extension spring
- 2 = Tensioning roller
- 3 = Coolant pump

Place on ribbed V-belt.
Start at tensioning roller and finish at coolant pump.
Hook extension spring into tensioning roller.
Mount cylinder head cover.

H8

Install fuel-injection pump

MB 200D, 250D, 300D (W 124)





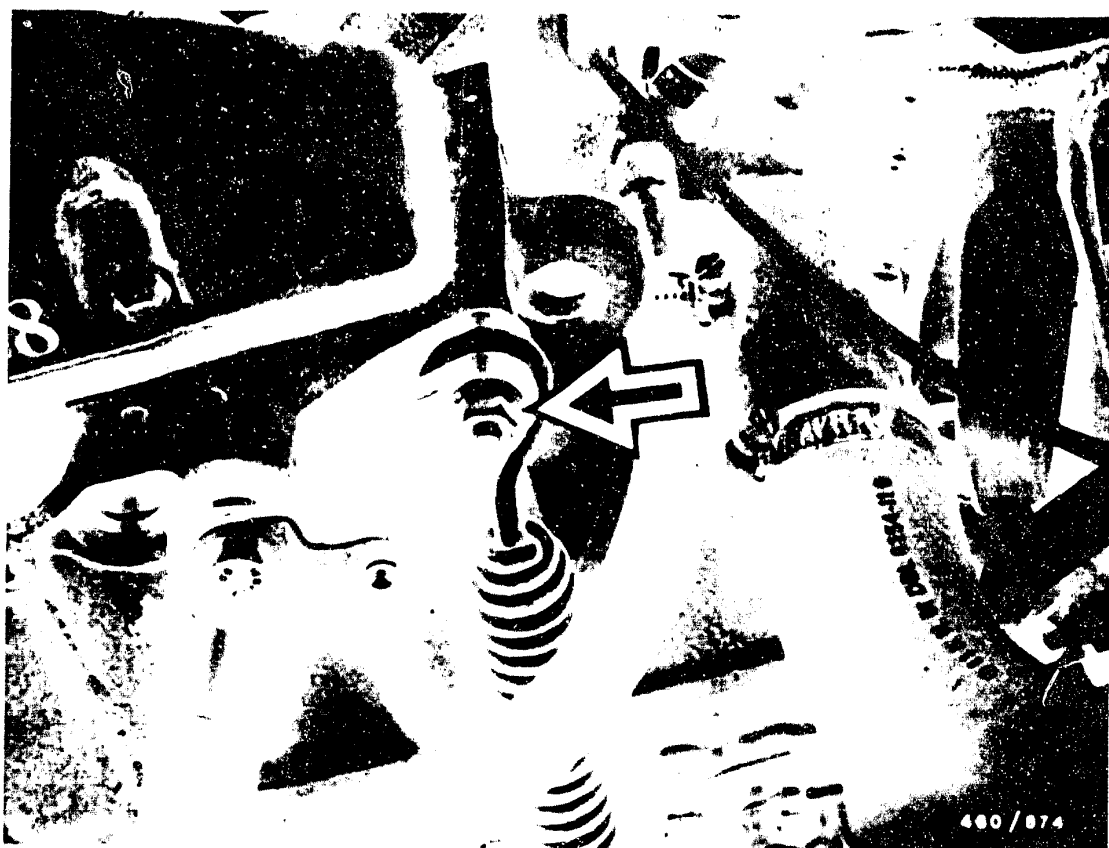
- 1 = Spring tensioning lever
- 2 = Fastening screw
- 3 = Extension spring

Tension extension spring. To do this, fit lever or mandrel (12 - 13 mm \emptyset , approx. 300 mm long) into bore on spring tensioning lever. Press lever to the left and slide fastening screw through spring tensioning lever.

H9

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





Tighten belt tensioner fastening nut (see picture, arrow).

H10

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





1 = Air-intake dome
2 = Air filter cover

Mount side holders for air guide housing (see picture b, arrows).

Mount air filter cover and slide on air-intake dome.

H11

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)



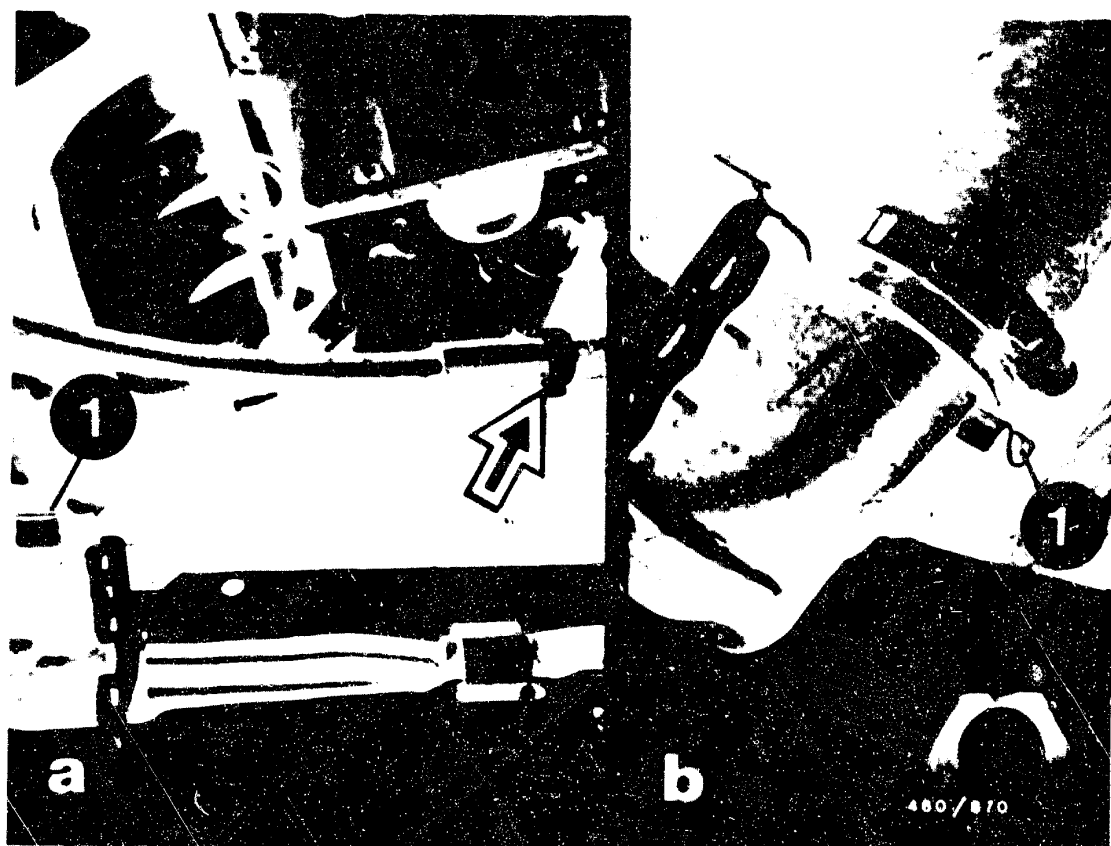


Mount fan and fan cover on radiator.
Tighten fan fastening screw (see picture, arrow).

H12

Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





1 = Fan shrouds

Mount fan shrouds (pictures a and b) and hose binder (arrow, picture a).

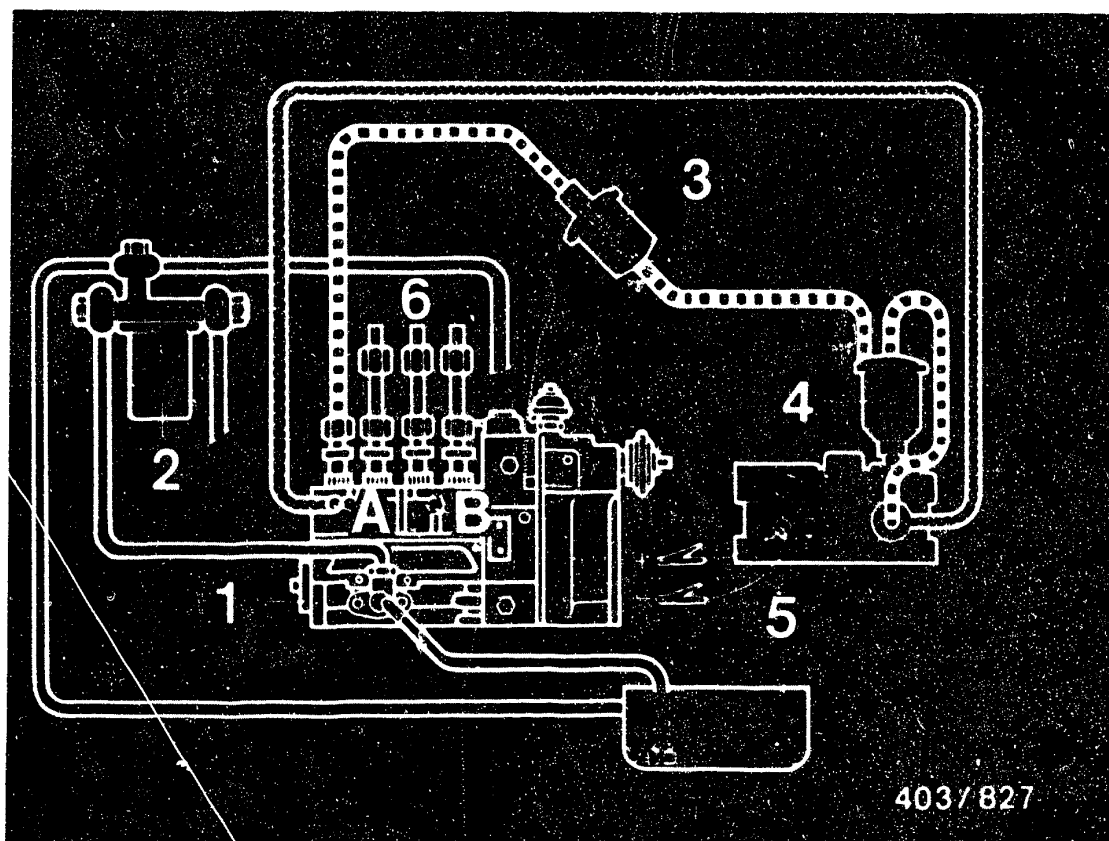
Connect negative cable to battery.

Mount front noise capsule.

H13


Install fuel-injection pump
MB 200D, 250D, 300D (W 124)





403/827

 Return line

 High pressure approx. 30 + 4 bar

- 1 = Injection pump
- 2 = Fuel filter
- 3 = Sight glass
- 4 = Start-of-delivery setting device
- 5 = Fuel tank
- 6 = Pressure-limiting valves

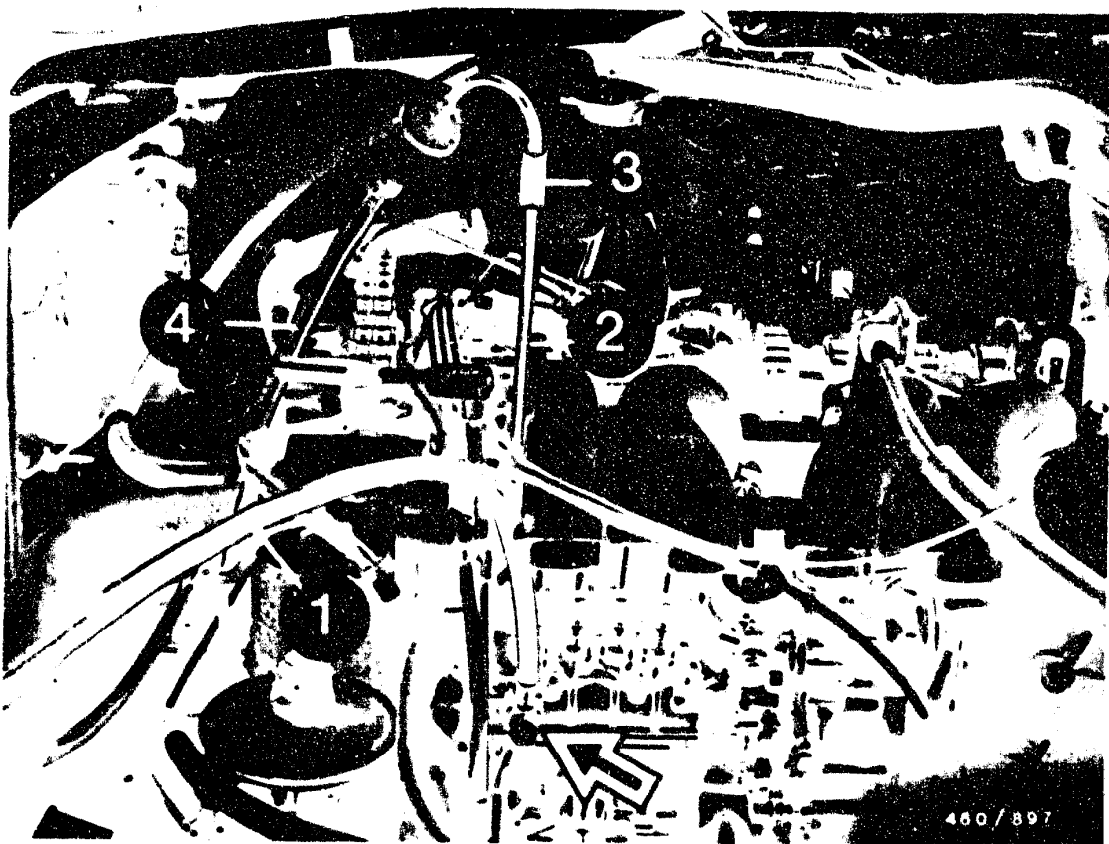
- A = Inlet-union screw, fuel inlet from start-of-delivery setting device
- B = Seal fuel return line with screw plug.

29. Injection timing

29.1 Static testing of start of delivery

Connection diagram for start of delivery - high-pressure overflow method.





- 1 = High-pressure hose
- 2 = Test line
- 3 = Pipe bend
- 4 = Return hose

Remove complete air filter housing. Disconnect vacuum line from shutoff box.

Place start-of-delivery setting device next to vehicle (e.g. on workshop trolley).

Connect high-pressure hose of device to suction chamber inlet of injection pump (see picture, arrow).

Seal return connection of pump by means of screw plug.

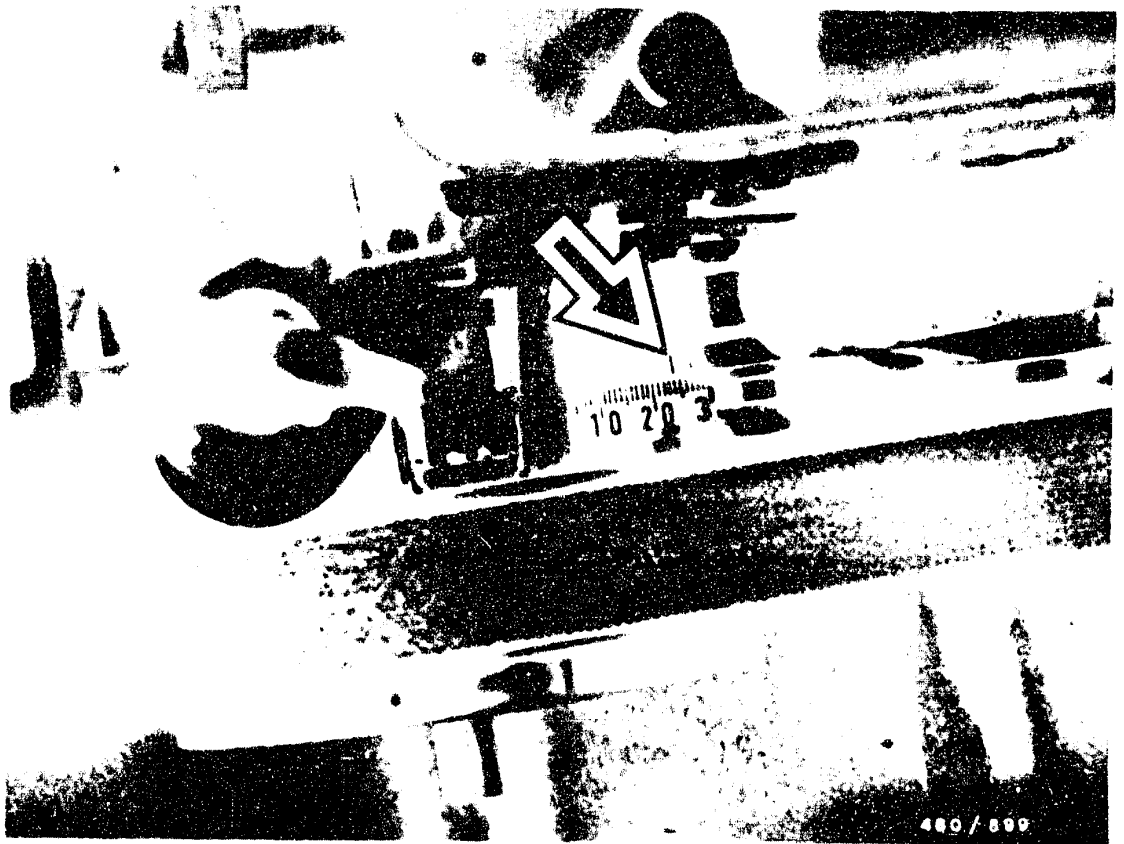
Secure test line KDEP-P 200/11 to delivery-valve holder of cyl. 1 (for start-of-delivery setting) and connect pipe bend. Hang return hose into fuel tank of start-of-delivery setting device.

H15

Injection timing

MB 200D, 250D, 300D (W 124)





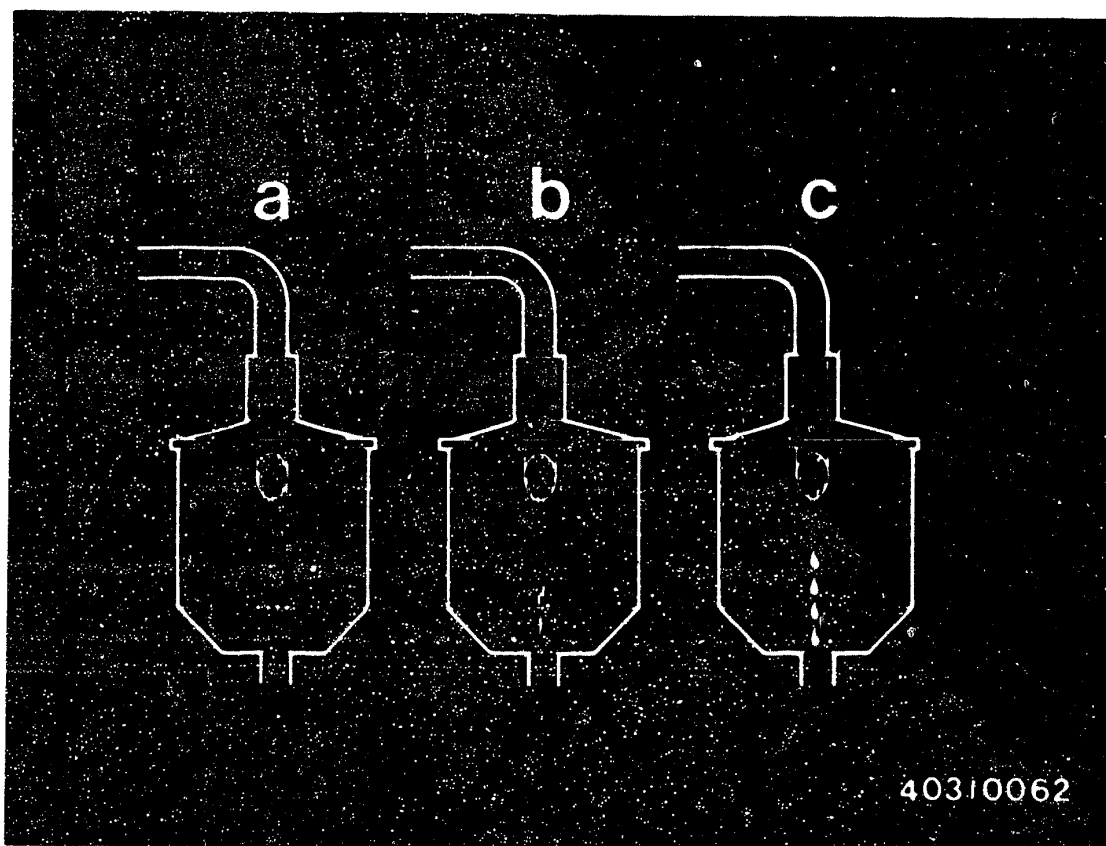
Connect electric leads of start-of-delivery setting device to vehicle battery (12 V) (red cable to battery +). Fill fuel tank of device with diesel fuel. Turn crankshaft over twice in engine direction of rotation and set to approx. 35° BTDC on compression stroke of cylinder 1 (valve overlap on cylinder 4). Press injection-pump control rod to full load. Switch on start-of-delivery setting device.

H16

Injection timing

MB 200D, 250D, 300D (W 124)

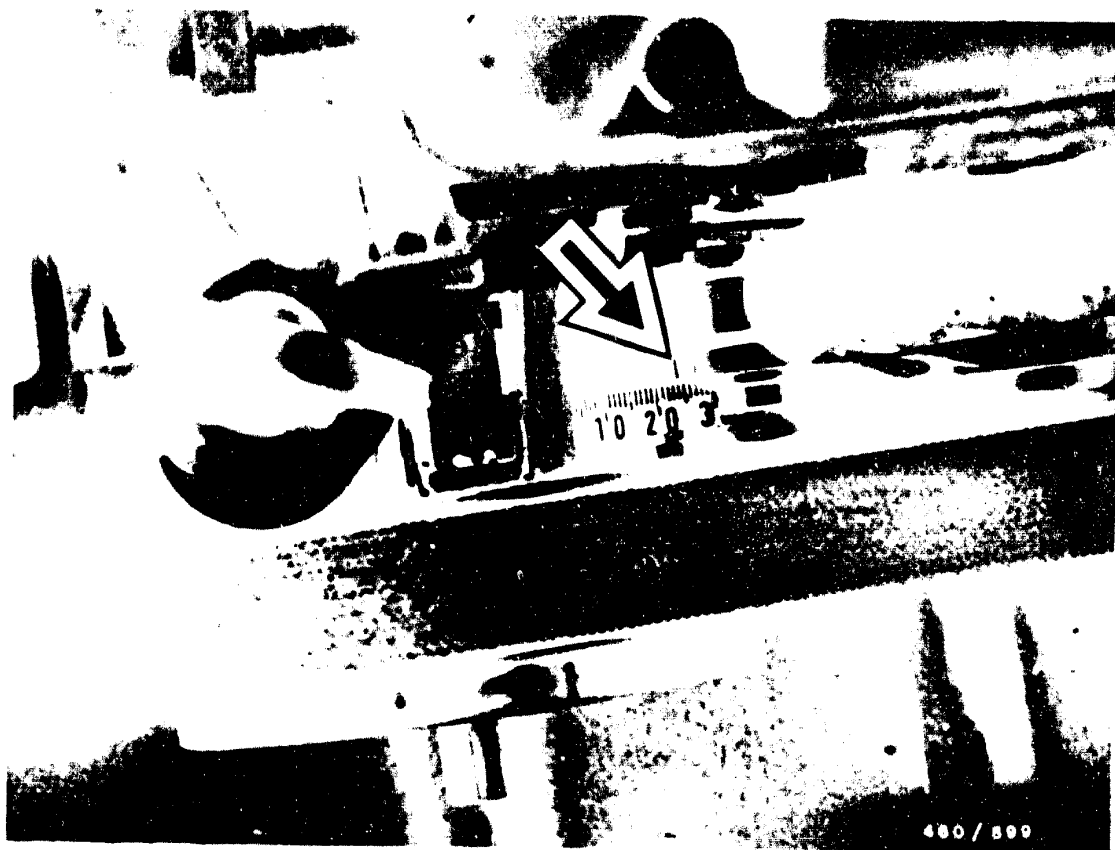




- a = Full fuel jet
- b = Tapered fuel jet just before start of delivery
- c = Chain of drips - start of delivery

Note: Switch on start-of-delivery setting device only for measuring. If injection nozzles are leaking, it is otherwise possible for fuel to enter the combustion chamber.

Slowly turn engine further in direction of rotation. While doing this, observe fuel jet in sight glass. The start of delivery has been reached when the fuel jet changes into a chain of drips.



In this position the engine marks for the start of delivery must align (see picture).

Set value 24° before TDC.

If set value not reached, a correction is necessary.

Adjusting:

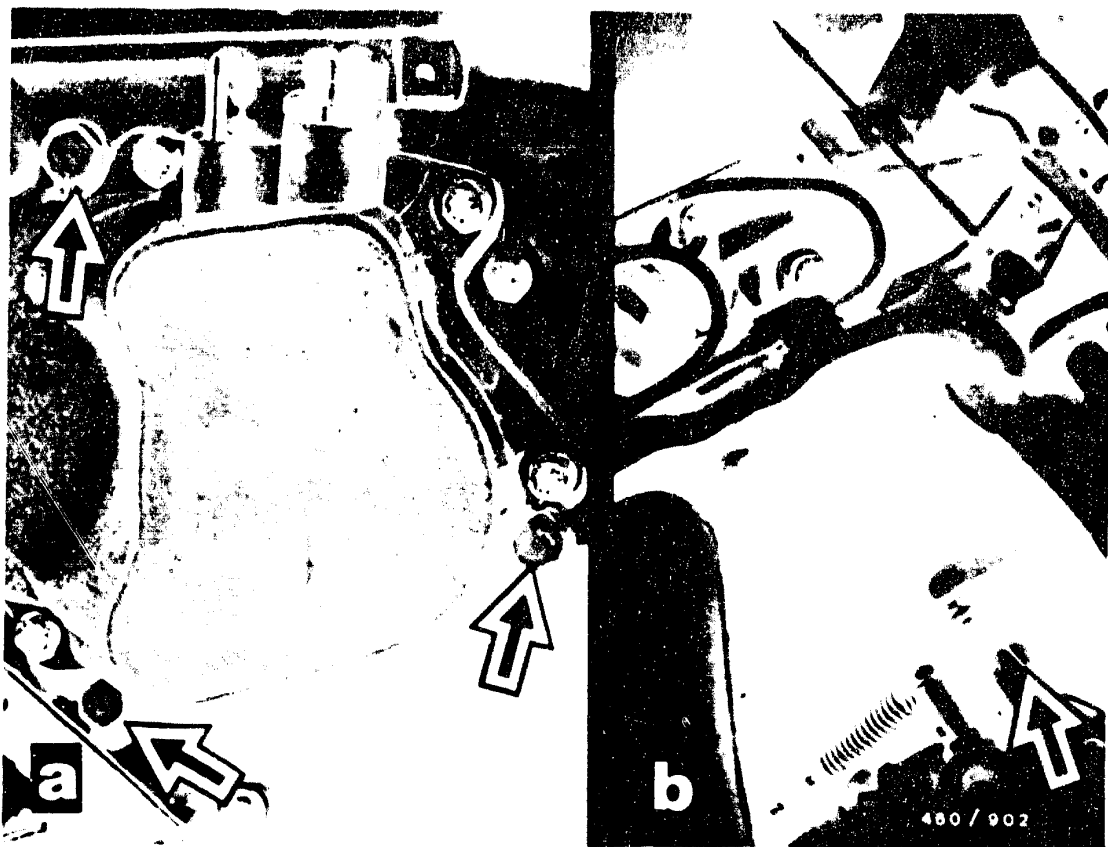
Turn engine over 2 full times in direction of rotation and set to start-of-delivery mark 24° BTDC on compression stroke of cylinder 1 (cylinder 4 on overlap) (see picture, arrow).

H18

Injection timing

MB 200D, 250D, 300D (W 124)





Loosen injection-pump fastening screws at drive end (arrows, picture a) and on support bracket (arrow, picture b).

Press injection-pump control rod to full load.
Switch on start-of-delivery setting device.

H19

Injection timing

MB 200D, 250D, 300D (W 124)





Pivot injection pump by turning the adjusting screw (see picture, arrow) until the fuel jet in the sight glass changes into a chain of drips.

Turning the adjusting screw to the right = start of delivery comes later

Turning the adjusting screw to the left = start of delivery comes earlier.

If the range of adjustment is not enough, the injection pump must be relocated.

Then repeat test of start of delivery.

Switch off start-of-delivery setting device and remove accessories. Tighten injection-pump fastening screws (20...25 Nm). Remove screw plug from injection-pump return. Connect return line. Mount injection line on cylinder 1.

H20

Injection timing

MB 200D, 250D, 300D (W 124)





1 = Air intake dome
2 = Air filter cover

Mount air guide housing (see picture b)

Mount air filter cover and slide on air intake dome.

Note:

The injection system bleeds itself automatically when the engine is started.

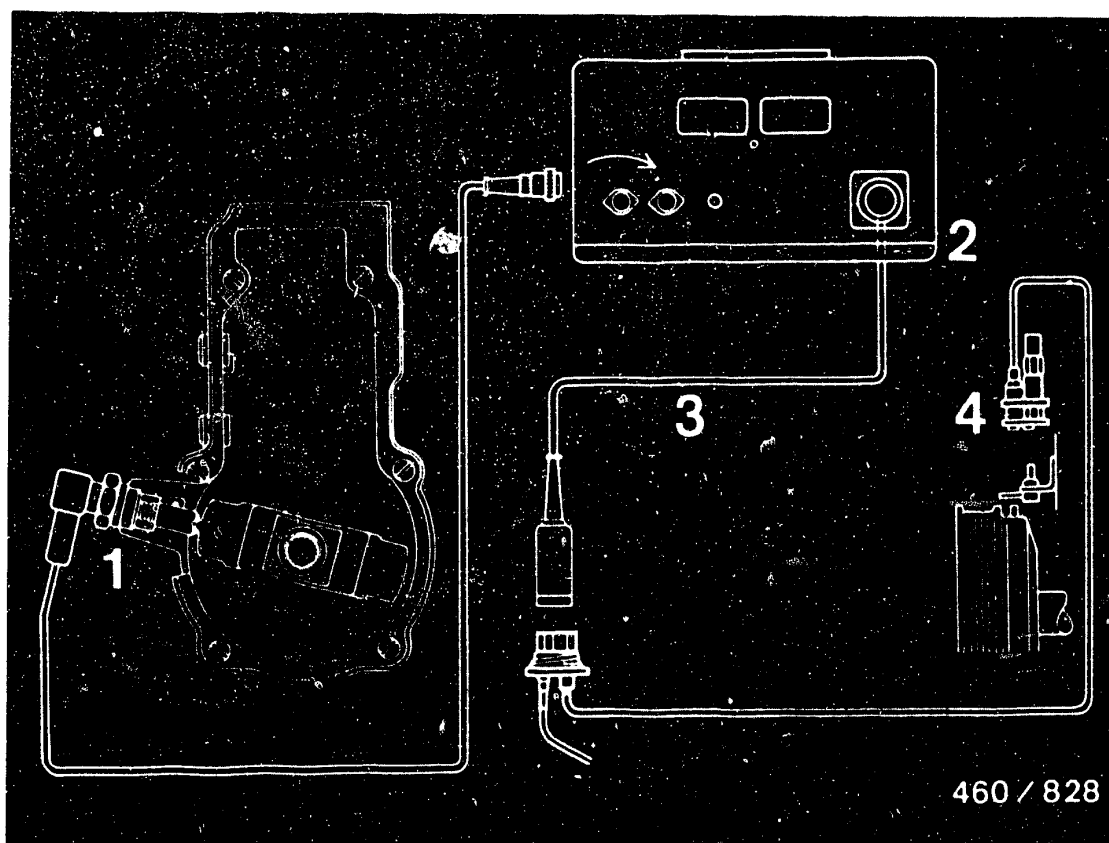
Let engine run and test all connections for leaks.

H21

Injection timing

MB 200D, 250D, 300D (W 124)

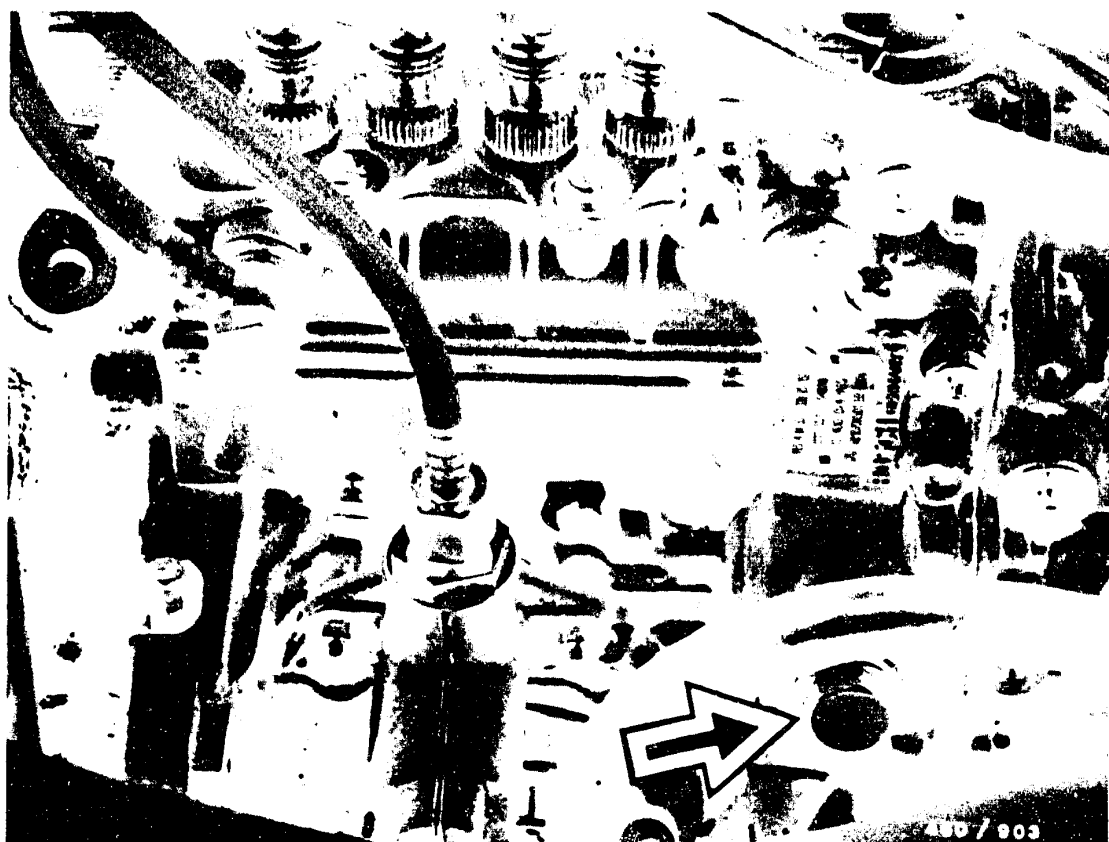




- 1 = Governor pulse generator, Daimler Benz part no.
617 589 102 100
- 2 = Diesel engine tester ETD 019.00, Bosch part no.
0 684 101 900
- 3 = Adapter line, Bosch part no. 1 684 463 147
- 4 = TDC pickup, engine 601, Daimler-Benz part no.
601 589 042 100
TDC pickup, engine 602/603, Daimler-Benz part no.
603 589 002 100

29.2 Dynamic testing of start of delivery

29.2.1 Connection diagram for dynamic testing of start of delivery with diesel engine tester ETD 019.00



Remove screw plug (see picture, arrow) from governor.
 Screw in governor pulse generator.
 Mount TDC pickup on bracket (engine).
 Connect governor pulse generator and TDC pickup, in
 accordance with connection diagram.
 Run engine at appropriate idle speed.

Engine	Idle speed " PLA"	Idle speed "ELR"
601	750 ± 50	720 ± 20
602	700 ± 50	680 ± 20
603	-	630 ± 20

Read off governor pulse value on motortester or diesel
 engine tester.

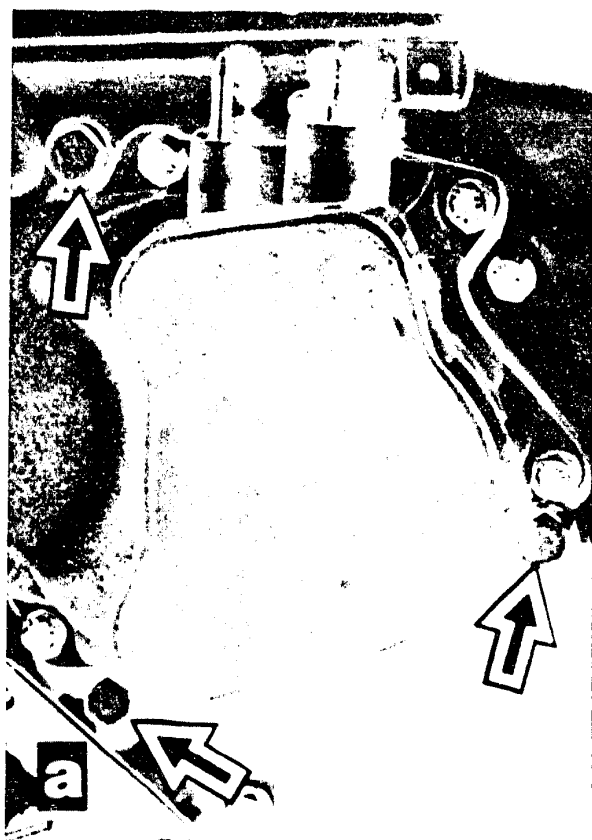
Should be: $15 \pm 1^\circ$ ATDC

H23

Injection timing

MB 200D, 250D, 300D (W 124)



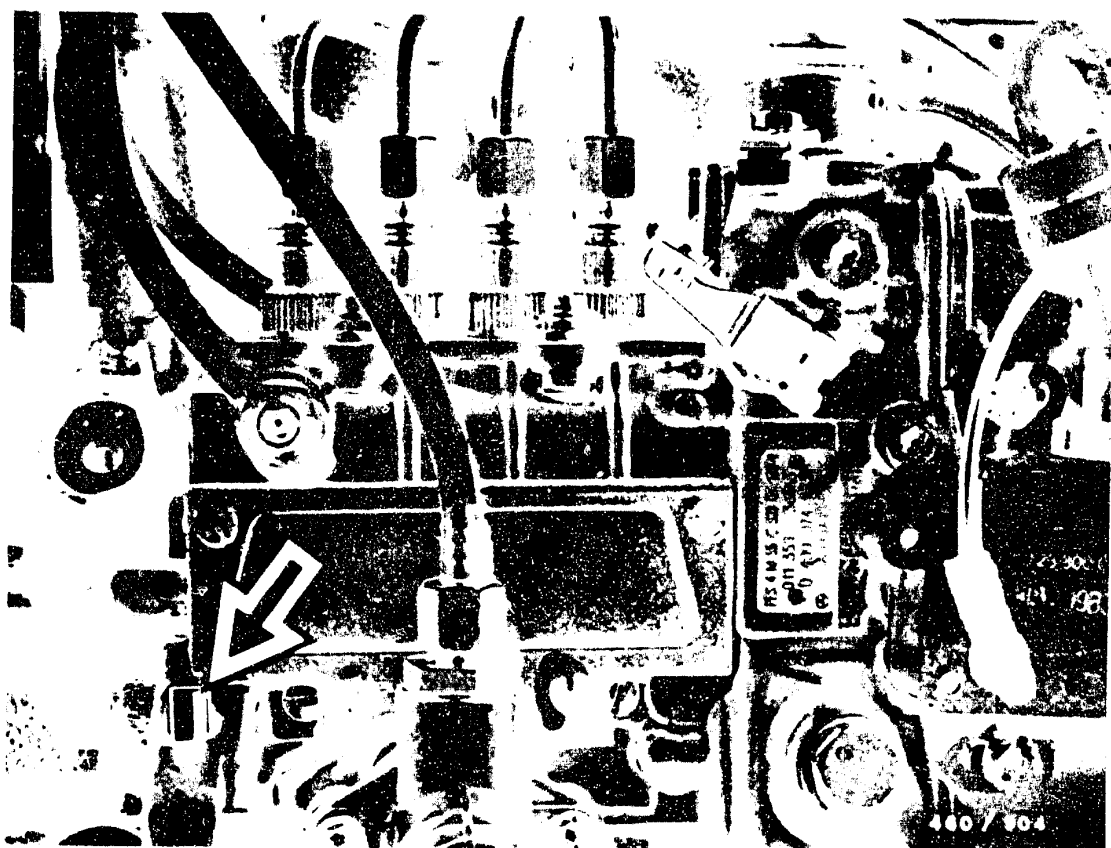


If set value not reached, injection pump must be turned.

Adjusting:

Loosen injection-pump fastening screws at drive end (arrow, picture a) and on support bracket (arrow, picture b).





Run engine at appropriate idle speed.

Set injection pump to set value - 15° ATDC by turning the adjusting screw (see picture, arrow).

Turning the adjusting screw to the right = start of delivery comes later

Turning the adjusting screw to the left = start of delivery comes earlier.

If the range of adjustment of the adjusting screw is not enough, relocate the injection pump.

Stop engine. Disconnect tester. Screw screw plug with seal into governor again. Check engine oil level.

Checking and setting values

Engine	Idle speed " PLA"	Idle speed. "ELR"
601	750 ± 50	720 ± 20
602	700 ± 50	680 ± 20
603	-	630 ± 20

J1

Injection timing

MB 200D, 250D, 300D (W 124)



TABLE OF CONTENTS

<u>Section</u>	<u>Coordinates</u>
Structure of microfiche	A 1
1. Special features	A 2
2. Test specifications	A 2
3. Diagram of fuel lines/connection diagrams	A 5
4. Terminal diagram of preheating system	A 10
5. Test equipment and tools	A 12
6. Installation position of components .	A 14
7. Adjust engine-speed regulation	A 16
8. Trouble-shooting chart	B 1
<u>Test steps</u>	
9. Check tank vent	B 9
10. Check routing of fuel-injection tubing	B 11
11. Renew filter box	B 12
12. Test injection system for leaks	B 14
13. Test fuel lines	B 17



Table of contents (continued)

<u>Section</u>	<u>Coordinates</u>
14. Smoke test/check air filter.....	B 18
15. Adjust idle speed..... - Vehicles with pneumatic idle increase -	C 2
16. Check pneumatic idle increase.....	C 7
17. Check electronic idle-speed control	C 19
18. Adjust accelerator.....	D 8
19. Check vacuum-control valve	D 17
20. Check vacuum shutoff for leaks.....	D 19
21. Test injection nozzles.....	D 22
22. Check fuel filter.....	E 5
23. Check fuel-supply pump.....	E 7
24. Check pre-heating system.....	E 8
25. Check timing device.....	F 3
26. Measure engine compression and compression loss.....	F 5



Table of contents (continued)

<u>Section</u>	<u>Coordinates</u>
27. Remove fuel-injection pump.....	F 15
28. Install fuel-injection pump.....	G 11
29. Injection timing.....	H 14
29.1 Check start of delivery - static.....	H 14
29.2 Check start of delivery - dynamic.....	H 22

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